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1. Bluerock. 2. Drummer-pigeon of Bachara. 3. German Drummer-pigeon. 4. Curly-pigeon. 5. Ruff or Capuchin. 6. German Tumbler. 7. Nun. 8. Almond. 9. Bearded tumbler. 10. Jacobin. 11. Egyptian Turbit. 12. Chinese Turbit. 13. German Turbit. 14, 15. Fantails. 16. English Pouter. 17. French Pouter. 18. Brown Pouter. 19. Carrier or Homing-pigeon. 20. German Carrier. 21. Cyprian Pigeon. 22. Italian Pigeon. 23, 24. Belgian Carriers.

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UNITED EDITORS ASSOCIATION
NEW YORK—CHICAGO
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SCHEME OF SOUND SYMBOLS

FOR THE PRONUNCIATION OF WORDS.

Note.—(-) is the mark dividing words respelt phonetically into syllables; (′), the accent indicating on which syllable or syllables the accent or stress of the voice is to be placed.

Sound-symbols employed in Respelling.	Representing the Sounds as exemplified in the Words.	Words respelt with Sound-symbols and Marks for Pronunciation.
ā	mate, fate, fail, aye	*māt, fāt, fāl, ā.*
ă	mat, fat	*măt, făt.*
â	far, calm, father	*fâr, kâm, fâ′ther.*
ä	care, fair	*cär, fär.*
aw	fall, laud, law	*fawl, lawd, law.*
ē	mete, meat, feet, free	*mēt, mēt, fēt, frē.*
ĕ	met, bed	*mĕt, bĕd.*
ė	her, stir, heard, cur	*hėr. stėr, hėrd, kėr.*
ī	pine, ply, height	*pīn, plī, hīt.*
ĭ	pin, nymph, ability	*pĭn, nĭmf, ă-bĭl′ĭ-tĭ.*
ō	note, toll, soul	*nōt, tōl, sōl.*
ŏ	not, plot	*nŏt, plŏt.*
ô	move, smooth	*môv, smôth̆.*
ö	Goethe (similar to *e* in her)	*gö′tėh.*
ow	noun, bough, cow	*nown, bow, kow.*
oy	boy, boil	*boy, boyl.*
ū	pure, dew, few	*pūr, dū, fū.*
ŭ	bud, come, tough	*bŭd, kŭm, tŭf.*
û	full, push, good	*fûl, pûsh, gûd.*
ü	French plume, Scotch guid	*plüm, güd.*
ch	chair, match	*chär, măch.*
ċh	German buch, Heidelberg, Scotch loch (guttural)	*bo͝ċh, hī′dėl-bĕrċh, lo͝ċh̆.*
g	game, go, gun	*gām, gō, gŭn.*
j	judge, gem, gin	*jŭj, jĕm, jĭn.*
k	king, cat, cot, cut	*kĭng, kăt, kŏt, kŭt.*
s	sit, scene, cell, city, cypress	*sĭt, sēn, sĕl, sĭt′ĭ, sī′prĕs.*
sh	shun, ambition	*shŭn, ăm-bĭsh′ŭn.*
th	thing, breath	*thĭng, brĕth.*
th̆	though, breathe	*thō, brēth̆.*
z	zeal, maze, muse	*zēl, māz, mūz.*
zh	azure, vision	*ăzh′ėr, vĭzh′ŭn.*

PERU, *pē-rô′*, Sp. *pā-rô′*: important maritime republic of S. America; bounded n. by Ecuador, w. by the Pacific, s. and s.e. by Chili and Bolivia, e. by Brazil; lat. 3° 25′—19° 30′ s., long. 67°—81° 20′ w. The general outline resembles a triangle, the base of which is formed by the boundary-line between P. and Ecuador, on the north. On the e. side of the Andes, between the Amazon and the Purus, there is a wide, unexplored region on which both P. and Brazil have claims, though the boundary is now generally regarded as marked by the Rio Javary. The area of P. has been much affected by the disastrous war with Chili 1879–81. Before the war, the area of P. was stated at 503,000 English sq. m., while the pop. by census of 1876 was 2,699,945, besides 350,000 uncivilized Indians. The total population, 1905, is estimated in P. at 3,000,000. The London Stock Exchange gives its estimate as 4,000,000. Chili occupies also the other Peruvian provinces of Tacna and Arica for 10 years; the ultimate destiny of these provinces being left to a plebiscite of the inhabitants. Chili further took possession of the coast provinces of Bolivia, which formerly bordered P. on the south. The country is 1,000 m. in length, 780 m. in extreme breadth along the n. boundary, but is little more than 50 m. wide in the south. The shores are in general rocky and steep; in the s., lofty cliffs rise from the sea; and, in some places, the water close inshore has a depth of 70 to 80 fathoms. Farther n., however, sandy beaches occur. There are few inlets and harbors. Those of Callao (the port of Lima) and Payta afford the most secure anchorage, and the others are Salaverry; Chimbote; Pisco; Islay, formerly the port of Arequipa, now almost superseded by Mollendo, a few m. s.; and Arica in Moquega, through which much of Bolivian trade passes. (Pisagua and Iquique, in Tarapaca, are now Chilian.) Landing by boats is always dangerous, on account of the dreaded surf, occasioned by the swell of the Pacific, which perpetually beats upon the coast; and when goods or passengers must be landed on unsheltered shores, recourse is had to small native rafts.

Islands.—The islands on the Peruvian coast, though valuable, are extremely few in number, and small in extent. In the n. are the three Lobos (i.e., *Seal*) Islands. The largest is 5 m. long by 2 m. broad; the others, 30 m. s.w., are much smaller. The islands of Macabi and Guañape, near the Lobos, also contain large quantities of Guano (q.v.). The Chincha Islands, three in number, the most famous of the whole, began to supply Europe and N. America with guano 1841. Each presents, on the e. side, a wall of precipitous rock, with a general slope toward the w. shore. The cavities and inequalities of the surface formerly were filled with guano, and this material covered the w. slopes to within a few feet of the water's edge. There was no vegetation. The North Island has an area of 202

acres: it is formed of felspar and quartz, and is slowly but certainly decreasing in size. This island was formerly wholly covered with thick layers of guano, which was quarried in some places to a depth of 80 ft. Hundreds of convicts were employed in cutting the guano and loading the vessels. The Chincha Islands ceased to be worked for foreign export 1872; a little guano was still taken for Peruvian use from the n. island. More than 8,000,000 tons had been obtained from this one source. In 1874, however, valuable new deposits of guano were discovered on the s. coast of Peru (now Chilian).

The grand physical feature of the country, and the source of all its mineral wealth, is the great mountain system of the Andes. For a general description of the formation and character of the Peruvian Andes, see ANDES.

Surface, Soil, and Climate.—The surface of P. is divided into three distinct and well-defined tracts or belts, whose climates are of every variety, from torrid heat to arctic cold, and whose productions range from the stunted herbage of the high mountain slopes to the oranges and citrons, the sugar-canes and cottons, of the luxuriant tropical valleys. These three regions are the *Coast*, the *Sierra*, and the *Montaña*.—The *Coast* is a narrow strip of sandy desert between the base of the Western Cordillera and the sea, and extending the whole length of the country. This tract, varying in breadth from 30 to 60 m., slopes to the shore with an uneven surface, marked by arid ridges from the Cordillera, and with rapid descent. It is mostly a barren waste of sand, traversed, however, by numerous valleys of astonishing fertility, most of which are watered by streams that have their sources high on the slopes of the Cordillera. Many of the streams are dry during the greater part of the year. Between these valleys extend deserts, sometimes 90 m. in width, perfectly trackless, covered with a fine, shifting yellow sand, which is often carried about by the wind in pillars 80 to 100 ft. in height. In the coast region, properly so called, rain is unknown. This is caused by the coast of P. being within the region of perpetual s.e. trade-winds. These winds, charged with vapors from the Atlantic, strike on the e. coast of S. America, and traverse that continent obliquely, distributing rains over Brazil. But their vapor is thoroughly condensed by the lofty Cordilleras, and their last particles of moisture are exhausted in powdering the summits of these ranges with snow, after which they fall down on the coast of P., cool and dry. The lack of rain, however, is compensated for to some extent by abundant and refreshing dews during the night. The climate of the coast is modified by the cool winds. In the valleys, the heat, though considerable, is not oppressive. The highest temperature observed at Lima in summer is 85°, lowest in winter 61°, F.

The *Sierra* comprises all the mountainous region be-

PERU AND BOLIVIA.
SCALE OF STATUTE MILES.
0 50 100 200 300
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ECUADOR
PERU
BRAZIL
BOLIVIA
ARG. REP.
PACIFIC OCEAN
AMAZON OR SOLIMOENS RIVER
Longitude West from Greenwich.
BOUNDARY CLAIMED BY PERU
Machala
Tumbez
Loja
Cariamanga
Poiut Parma
Paita
Piura
Aguja Pt.
Jayanca
Chiclayo
Caxamarca
Macabi
Trujillo
GUANAPE Is.
Moyobamba
Chachapoyas
Falls
Cajamarquilla
Guamachuco
Huaraz
Huanuco
Lake Lauricocha
Source of the Amazon
Cerro de Pasco
Cajatambo
Huaura
Tarma
Callao
LIMA
Huancavelica
Ayacucho
CHINCHA ISLANDS (GUANO)
Ica
Nasca
Port S. Juan
Acari
Camana
Arequipa
Mollendo
Moquegua
Ho
Tacna
Arica
Guallateiri Vol.
22,000 ft.
Pisagua
Tarapaca
Iquique
Patillos
Cobija
Mejillones Bay
Atacama
Incaguasi Mt.
Ascotan
Luya
Oran
Tartagal
Tarija
Tupiza
Camargo
Potosi
Pomabamba
SUCRE OR CHUQUISACA
Oruro
Aullagas Lake
Cochabamba
Tapacari
Santa Cruz
Vallegrande
S. Miguel
S. Jose
Oliden
Matto Grosso
Trinidad
Exaltacion
Concepcion
Reyes
L. Rogagua
R. del Vale
Madre de Dios River
Aquiry
Purus River
Tapaua River
Jurua River
Tabatinga
Olivenca
Ica
Loreto
Oran
Nauta
Iquitos
Pebas
Urarinas
Sarayacu
S. Rosa
Ega or Teffe
Coary
Borba
Crato
Balsamao
Fort S. Antonio
Falls of the Madeira
Madeira River
Guapore River
Tapajos R.
Juruena River
Sipotuba
Paraguay R.
Pilcomayo River
THE GRAN CHACO
Vilcanota
Asangaro
Sorata
Titicaca
Nimani Mt.
La Paz
Sahama Vol.
Mist Vol.
Puno
Vincocaya
Ransa
Cuzco
Abancay
Tarma
Huancavelica
Cerro de Pasco
Huanuco
Huaraz
Cajatambo
Lima
Pampa
Ayacucho
Arequipa
Moquegua
Tacna
Arica
Tarapaca
Iquique
Patillos
Cobija
Mejillones Bay
Atacama
Oruro
Potosi
Cochabamba
Santa Cruz
Vallegrande
Tupiza
Camargo
Tarija
Pilcomayo
Tartagal
Oran
Luya
Ascotan
Aullagas Lake
Tapacari
Mizque Grande
Rio Grande
Sierra Aguapey
Sierra Geral
Madeira River
Machado River
Guapore River
Beni River
Mamore River
Jurua River
Tapaua River
Javari River
Urubamba R.
Pachitea R.
Huallaga River
Marañon
Jaen
Miles
450 Miles
540 Miles
400 Miles
500 Miles
700 Miles
4 000 Miles
80
75
70
65
60
5°
10°
15°
20°

tween the w. base of the maritime Cordillera and the e. base of the Andes, or the Eastern Cordillera. These ranges are, in this country, about 100 m. apart on an average, and have been estimated to cover 200,000 sq. m. Transverse branches connect the two ranges; and high plateaux, fertile plains, and deep tropical valleys lie between the lofty outer barriers. The superiority in elevation alternates between the two principal ranges. The e. range, or, as it is generally called, the Andes, has the superiority in height in the s. half of this mountain system. It abuts on the plain, from the Bolivian frontier, in a majestic mass, surmounted by stupendous pinnacles, rugged in outline, and most frequently rising in splintered needle-like peaks, covered with snow. N. of lat. 13° s., however, the Western Cordillera assumes the grander character, and preserves it until it crosses the n. frontier. The scenery of the Western Cordillera is broader and more massive in character, and its summits less pointed than those of the Andes. Rugged paths, sometimes so narrow as barely to afford footing to the mules invariably used in such ascents, lead up its steep sides. Occasionally, from these narrow passes, gaping and apparently bottomless precipices drop perpendicularly downward from the very feet of the traveller, and the prospect is rendered still more frightful by the distant roar of a torrent, hidden by mists, at the bottom of the chasm. Occasionally, also, the mountain route leads over abysses 500 ft. in depth, across which, as bridge, a few poles are thrown, which roll uncomfortably about under the feet. In traversing these dangerous passes, which line the huge rocks like aerial threads, the traveller often comes on most picturesque and beautiful scenery. The clefts and sides of the hills, even at altitudes which may be called Alpine, are clothed with wild flowers, many of which, now long cultivated in northern countries, have become highly prized as garden-plants. Verbenas, lupines, blue and scarlet salvias, fuchsias, calceolarias, and the fragrant heliotrope add a sense of beauty to the sense of power which the stupendous scenery imparts. The following are the most striking and distinctive physical features of the Sierra, beginning from the s.: 1. The plain of Titicaca, partly in P., partly in Bolivia, is inclosed between the two main ridges of the Andes, and is said to have an area of 30,000 m.—greater than that of Maine or of Ireland. In its centre is the great Lake Titicaca, 12,846 ft. above sea-level, or 1,600 ft. above the loftiest mountain pass (the Col of Mont Cervin) of Europe. The lake is 115 m. long, 30 to 60 m. broad, 70 to 180 ft. deep, 400 m. in circumference. Its shape is irregular; it contains many islands, and several peninsulas abut on its waters. 2. The Knot of Cuzco: the mountain chains which girdle the plain of Titicaca trend toward the n.w., and form what is called the Knot of Cuzco. The Knot comprises six minor mountain chains, and has an area thrice larger than that of Switzerland. Here the valleys have an E. Indian cli-

mate, and are rich in tropical productions; n. and e. of the Knot extend luxuriant tropical forests, while the numberless mountain slopes are covered with waving crops of wheat, barley, and other cereals, and with potatoes; and, higher up, extend pasture-lands, where the vicuña and alpaca feed. 3. The valley of the Apurimac, 30 m. in average breadth, extending n.w. about 300 m.: this valley is the most populous region of Peru. 4. The Knot of Pasco: from Cuzco proceed two chains toward the n.w.; they unite again in the Knot of Pasco, which contains the table-land of Bombon, 12,300 ft. above sea-level, as well as other table-lands at a height of 14,000 ft., highest in the Andes; otherwise, however, the physical features of the country resemble those of the vicinity of Cuzco. 5. The vale of the river Marañon: this valley, more than 300 m. in length, is narrow, deep, and nearer the equator than any other valley of the Sierra; consequently, it is the hottest portion of this region, and its vegetation is thoroughly tropical in character. The conformation of the surface of the Sierra is very wonderful. After the table-lands of Tibet, those of the Peruvian Andes are the highest in the world; but, unlike those of Tibet, which are mere grassy uplands, the table-lands of P. are the seat of a comparatively high civilization, and are studded with towns and villages, perched on heights exceeding in elevation the summits of the Jungfrau and the Wetterhorn. Nor are such towns the mere eyries of miners who are tempted to ascend thus high in search of the precious metals; for, even at this elevation, the climate is pleasant, and wheat, maize, barley, rye, and potatoes thrive well. The city of Cuzco, in a region of rare beauty, and with a temperate climate, is 11,380 ft. above sea-level, or 2,000 ft. higher than the great St. Bernard. The climate of the Sierra, however, is not always so charming. In general terms, it may be described as mild and variable, with moderate rains. In the district of Paucartambo, rain falls 300 days in the year. A country, however, of such uneven surface, of snow-covered peaks and tropical valleys, embraces every variety of climate. In all the lower regions of the country the climate is warm, but healthful; in the uplands, and on the highest plateaux, it is often inclement. Violent storms beat on the plain of Titicaca; and terrific tempests, accompanied by thunder and lightning, roll frequently around the table-lands of Pasco (q.v.), where, indeed, the climate is so cold that, but for the mines, which have attracted hither a numerous population, this region might have remained uninhabited. At the height of 9,000 ft. above sea-level, the mean temperature is 60° Fahrenheit, and the variation throughout the year is not great. The highest peaks of the country rise above 22,000 ft., and many peaks in both ranges are 17,000 to 20,000 ft. high. In the Western Cordillera, and in the s. of the country, are four volcanoes—Candarave, Ubinas, Omate, and Arequipa. The soil of the Sierra is of great variety; but wherever it is cultivated, it is productive.

The *Montaña*, forming two-thirds of the entire area of the country, stretches away hundreds of leagues e. from the Andes, to the confines of Brazil. On the n. it is bounded by the Amazon, on the s. by Bolivia. It consists of vast, impenetrable forests and alluvial plains, is rich in all the productions of tropical latitudes, is of inexhaustible fertility, and teems with animal and vegetable life. It is still, however, almost wholly unproductive to man. The silence of its central forests has never been disturbed by the civilized explorer, and its only human inhabitants are a few scattered tribes of Indians. The Montaña is watered by numberless streams and by a large number of important rivers. It belongs wholly to the basin of the Amazon. Along the head-waters of the Purus, which, flowing through beautiful forest-covered plains, approaches within 60 m. of Cuzco, there were formerly numerous Spanish farms, where great tracts of forests had been cleared, and where crops of coca, cocoa, sugar, and other tropical productions, were regularly raised. These farms have, since 1861, been abandoned, and the encroaching forest has already obliterated their sites. The upper waters of the Purus are the headquarters of a savage and barbarously cruel tribe of wild Indians, called Chunchos. These untamable savages have shown the greatest hostility to the advance of civilization. They murdered the settlers, or drove them to take refuge in some less advanced settlement. When Markham visited this region 1853, a few farms remained; in a paper, however, which he communicated to the *Journal of the Royal Geographical Soc.*, dated 1861, he further reported that the Chunchos have finished their barbarous work, for the settlers have either all been massacred or driven back from the forest, so that now not a single settlement remains. The rich valleys of Paucartambo, once covered with flourishing Spanish farms, have again become one vast tropical forest. The virgin soil of the Montaña is of amazing fertility; and its climate, not oppressively hot, is healthful. The forests consist of huge trees, of which some are remarkable for beauty of their wood, others for valuable gums and resins, others as timber-trees. A rank undergrowth of vegetation covers the country, and the trees are often chained together and festooned with parasites and closely matted creepers. In this region, mostly undisturbed by the voice of man, civilized or savage, animal life flourishes in endless variety, and birds of the brightest plumage flit among the foliage. Among the products yielded here in spontaneous abundance are the inestimable Peruvian bark (see CINCHONA), India-rubber, gum copal, vanilla, indigo, copaiba, balsam, cinnamon, sarsaparilla, ipecacuanha, vegetable wax, etc. On the w. fringe of the Montaña, where there are still a few settlements, tobacco, sugar, coffee, cotton, and chocolate are cultivated with complete success.

Hydrography.—The hydrography of P. may be divided into three systems—those of Lake Titicaca, the Pacific,

and the Amazon. The streams that flow into Lake Titicaca are few and inconsiderable. The rivers which, having their sources in the Western Cordillera, flow w. into the Pacific, are about 60 in number; but many of them are dry in summer, and even the more important are rapid and shallow, have a short course, are not navigable even for canoes, and are used mainly for irrigation. All the great rivers of P. are tributaries of the Amazon. The Marañon, rising between the E. and W. Cordilleras, and flowing tortuously to the n.n.w., is generally considered the head-water of the Amazon (q.v.). The Huallaga rises near the town of Huanuco, and flows n. to the Amazon: it is navigable 600 m., the head of its navigation (for canoes) being at Tingo Maria, within 100 m. of its source. The Yucayali, or Ucayali, an immense river, enters the Amazon 210 m. below the Huallaga: its tributaries and upper waters, among which are the Pampas and the Apurimac, drain the greater portion of the Peruvian Sierra. The Purus, which reaches to the valleys of Paucartambo, within 60 m. of Cuzco, has recently been explored. Several of its sources are known; and it enters the Amazon by four mouths, a little above Barra. It flows through what is perhaps the richest and most beautiful region of Peru. Many attempts have been made to explore this river, but none were successful till Chandless (1865–6) explored it and its tributary, the Aguirey. Sailing down the Rio Negro, from Manoas to the Amazon, he reached the mouth of the Purus, and ascended 1,866 m. He found that it flowed in a tortuous course through a rich alluvial plain, and that the few Indians on its upper course were still as primitive as is indicated by the use of only stone hatchets. He ascertained that the Rio Madre de Dios is not the head-water of the Purus. He then ascended the Aguirey, principal affluent of the Purus, in the hope that it might afford communication with that south-Peruvian river, but failed, owing to difficulties insuperable by him, to settle the question.

Productions, Exports and Imports, Revenues, etc.—The wealth and resources of P. consist, not in manufactures, but entirely in vegetable, mineral, and animal products. Of the precious metals, the production has greatly fallen off since P. became an independent state; and this country, which formerly stood in the same relation to Spain that Australia does to Great Britain, now contributes little to the metallic wealth of the world. The Andes abound in mines of gold, silver, copper, lead, bismuth, etc.; and in the Montaña, gold is said to exist in abundance in veins and in pools on the margins of rivers. The mining claims in P. are more than 10,000 in number, but fully one-third are unworked. The value of all ores produced, including gold, silver, copper, lead, zinc, quicksilver, coal, salt, sulphur and petroleum, 1903, was $4,764,060; 1904, $3,835,940. The public revenue of

P. is derived mainly from the sale of guano, and only to a small extent from customs. The consequences of the war (1879–81) brought serious decline in trade. The revenue 1904, was $9,952,843, expenditures, 1904, $9,424,745. Anthracite and bituminous coal and lignite exist but are not worked extensively. The petroleum product, 1903 (2 factories) was 33,000 tons of crude oil and 300,000 gallons of kerosene; 1904, 52,000 tons of crude oil and 600,000 gallons of kerosene. The manufactures of P. are chiefly straw hats, plated wares, woolen blankets and woven cloths. There are 1,000 looms in the cotton factories of P., producing 15,000,000 yards of cloth annually.

The principal imports are cotton, woolens, linens, jute and hemp goods, metal goods, machinery, drugs, coal and timber. The imports, 1904, aggregated $21,490,000. The principal exports are ores, sugar, wool, cotton, coffee, borate of lime, rice and spirits. The exports, 1904, aggregated $20,313,145. The value of imports to U. S. 1905, was $3,152,964; exports from U. S., $3,657,225. The tonnage of vessels entered at all ports of P. 1904 was 1,947,699; cleared 1,728,400. Besides the precious metals, P. possesses other most important mineral resources. In addition to the guano, an important article of national wealth is nitrate of soda, found in immense quantities in the province of Tarapaca (now Chilian).

In 1902, there were 1,146 miles of railways, 2,130 miles of telegraph lines and 3,000 miles of telephone are reported (1905–6). Several hundred miles of railroad are in course of construction, including a line across the summit of the Cordillera de los Andes, and presenting engineering difficulties even more extraordinary than those overcome in the Mont Cenis Tunnel.

The vegetable productions of P. are of every variety, embracing all the products both of temperate and of tropical climes. The European cereals and vegetables are grown with perfect success, with maize, rice, pumpkins, tobacco, coffee, sugar-cane, cotton, etc. The chief agricultural products are cotton, coffee and sugar. The product of cotton, 1904, was 7,414 tons; coffee, 1,031 tons; sugar, 129,879 tons. The wool product, 1904, was 3,550 tons. The guano deposits delivered over by Chili to P. are estimated to weigh from 40,000 to 50,000 tons. The net receipts of P. from guano, 1903–4 were $800,000. Fruits of most delicious flavor are grown in endless variety. Cotton is produced in gradually increasing quantity.

The animals comprise those of Europe, together with the Lama (q.v.) and its allied species. Although P. produces so much excellent wool, almost the whole of the woolen fabrics used as clothing by the Indians are manufactured in Yorkshire, England.

Ancient Civilization and History.—Peru is now passing through its third historical era, and is manifesting its third phase of civilization. The present era may be said to date from the conquest of the country by the Spaniards in the early part of the 16th c.; the middle era comprises the

rule of the Incas; and the earliest era, about which exceedingly little is known, is that Pre-Incarial period, of unknown duration, during which a nation or nations living in large cities flourished in the country, and had a civilization, a language, and a religion, different, perhaps in some cases more advanced, than those of the Incas who succeeded them and overran their territories. Whence these Pre-Incarial nations came, and to what branch of the human family they belonged, remain unanswered questions. Their existence, however, is clearly attested by the architectural remains, sculptures, carvings, etc., which they have left. Ruins of edifices constructed both before the advent of the Incas, and contemporary with, and independently of, them, are found throughout the country. On the shores of Lake Titicaca, e.g., are the ruins of Tia-Huanacu, consisting of sculptured monolithic doorways, one of which is 10 ft. high and 13 ft. wide; of pillars, 21 ft. high, placed in lines at regular distances; and of immense masses of hewn stone, some being 38 ft. long by 18 broad. In 1846 several colossal idols were excavated, some being 30 ft. long, 18 wide, and 6 thick. The idols are in the form of statues, and the ears are not enlarged by the insertion, in the lobes, of silver rings, as those of sculptured figures executed in Incarial times invariably are. The ancient fragments of buildings on these shores were beheld with astonishment by the earliest of Incas, who, by their own confession, accepted them as models for their own architecture. The name Tia-Huanacu is comparatively modern, having been conferred by one of the Incas; neither history nor tradition has handed down the original name. The ruins are 12,930 ft. above sea-level, and one of the many mysteries which have crowded around this ancient site is that this spot, in the midst of what is now generally a frozen desert, and where the rarity of the air must be so great as to be hurtful, should have been chosen as the seat, as it is generally believed to have been, of an ancient government. Of the character and degree of the civilization of the Pre-Incarial races, almost nothing is known. It is worthy of note, however, that at Pachacamac, 25 m. s. of Lima, where are the remains of a now wholly deserted city, and of a great temple, the religion seems to have been a pure Theism; for when the Peruvians of Cuzco carried their victorious arms across the Cordilleras to this district, they beheld this temple (the doors of which are said to have been of gold inlaid with precious stones) with astonishment, not only because it rivalled, if not surpassed, in splendor the famous Temple of the Sun at Cuzco, but because it contained no image or visible symbol of a god. It was raised in honor of an invisible and mysterious deity, whom the inhabitants called Pachacamac, Creator of the World (from two words of the anc. Peruvian language: *Pacha*, the earth; and *Camac*, participle of the verb *Camani*, to create). The Peruvians did not dare to destroy this temple, but contented themselves with building at its side a

Temple of the Sun, to the worship of which they gradually won over the inhabitants.—See Bollaert's *S. America* (1860); Squier's *Peru* (1876); Markham's *Peru* (1880); Gallenga's *S. America* (1880); Reiss and Stübel, *Peruvian Antiquities* (1881).

Regarding the origin of the Incas, nothing definite can be said. We have no authorities on the subject except the traditions of the Indians; and these, besides being outrageously fabulous in character, are also conflicting. It appears, however, from all the traditions, that Manco, the first Inca, first appeared on the shores of Lake Titicaca, with his wife, Mama Ocllo. He announced that he and his wife were children of the Sun, and were sent by the glorious Inti (the Sun) to instruct the simple tribes. He is said to have carried with him a golden wedge, or, as it is sometimes called, a wand. Wherever this wedge, on being struck upon the ground, should sink into the earth, and disappear forever, there it was decreed Manco should build his capital. Marching northward, he came to the plain of Cuzco, where the wedge disappeared. Here he founded the city of Cuzco, became the first Inca (a name said to be derived from the Peruvian word for the Sun), and founded the Peruvian race, properly so called. Manco, or Manco Capac (i.e., Manco the Ruler), instructed the men in agriculture and the arts, gave them a comparatively pure religion, and a social and national organization; while his wife, Mama Ocllo, who is represented as being also his sister, taught the women to sew, to spin, and to weave. Thus, the Inca was not only ruler of his people, but also the father and the high-priest. The territory held by Manco Capac was small, extending about 90 m. from e. to w., and about 80 m. from n. to s. After introducing laws among his people, and bringing them into regularly organized communities, 'he ascended to his father, the Sun.' The year generally assigned as that of his death, after a reign of 40 years, is A.D. 1062. The progress of the Peruvians was at first so slow as to be almost imperceptible. Gradually, however, by their wise and temperate policy, they won over the neighboring tribes, who readily appreciated the benefits of a powerful and fostering government. Little is clearly ascertained regarding the early history of the Peruvian kingdom, and the lists given of its early sovereigns are not at all to be trusted. They invented no alphabet, therefore could keep no written record of their affairs; so that almost all we can know of their early history is derived from the traditions of the people, collected by the early Spaniards. Memoranda were indeed kept by the Peruvians, and, it is said, even full historical records, by means of the *quipu*, a twisted woolen cord, upon which other smaller cords of different colors were tied. Of these cross-threads, the color, the length, the number of knots on them, and the distance of one from another, all had their significance; but after the invasion of the Spaniards, when the whole Peruvian system of government and civilization un-

derwent dislocation, the art of reading the quipus seems either to have been lost, or was effectually concealed. Thus it is that we have no exact knowledge of Peruvian history further back than about one century before the coming of the Spaniards. In 1453 Tupac Inca Yupanqui, eleventh Inca, according to the list given by Garcilasso de la Vega, greatly enlarged his already widespread dominions. He led his armies southward, crossed into Chili, marched over the terrible desert of Atacama, and, penetrating as far s. as the river Maule (lat. 36° s.), fixed there the s. boundary of Peru. Returning, he crossed the Chilian Andes by a pass of unequalled danger and difficulty, and at length regained his capital, which he entered in triumph. While thus engaged, his son, the young Huayna Capac, heir to the fame, as well as the throne, of his father, had marched n. to the Amazon, crossed that barrier, and conquered the kingdom of Quito. In 1475 Huayna Capac ascended the throne, and under him the empire of the Incas attained its greatest extent, and the height of its glory. His sway extended from the equatorial valleys of the Amazon to the temperate plains of Chili, and from the sandy shores of the Pacific to the marshy sources of the Paraguay. Of this immense territory, Cuzco, as its name implies (the word signifies navel), was the great centre; great roads branched off from it n., e., s., and w., and ramified through every part of the kingdom. The greatest highway of the country was that from Quito, through Cuzco, into the Chilian dominions. In its construction, galleries were cut for leagues through the living rock; rivers were crossed by bridges of plated osiers, that swung in the air; precipices were ascended by staircases artificially cut; and valleys were filled up with solid masonry. It was 1,500 to 2,000 m. long, about 20 ft. broad, built of heavy flags of freestone. On all the great routes were posts or small buildings, about 5 m. apart, attached to which were a number of runners, whose business it was to carry forward the dispatches of government. By means of these messengers, fresh fish caught on one day at Lurin, on the Pacific, is said to have been eaten the next day at Cuzco, at a distance of 300 m., over a road traversing the wildest and most mountainous country in the world. Order and civilization accompanied conquest among the Peruvians, and each tribe that was vanquished found itself under a careful paternal government, which provided for it, and fostered it in every way.

The government of P. was a pure, though mild, despotism. The Inca, as the representative of the Sun, was the head of the priesthood, and presided at the great religious festivals. He imposed taxes, made laws, and was the source of all dignity and power. He wore a peculiar head-dress, of which the tasselled fringe, with two feathers placed upright in it, was the proper insignia of royalty. Of the nobility, all those descended by the male line from the founder of the monarchy shared, in

common with the ruling monarch, the sacred name of Inca. They wore a peculiar dress, enjoyed special privileges, and lived at court; but none of them could enter the presence of the Inca except with bare feet, and bearing a burden on the shoulders, in token of allegiance and homage. They formed, however, the real strength of the empire; and, being superior to the other races in intellectual power, they were the fountain whence flowed that civilization and social organization which gave P. a position above every other state of S. America. Prior to the arrival of the Spaniards, P. contained a pop. of 30,000,000—twelve times greater than at the present day. The empire was divided into four parts, into each of which one of the great roads branched from Cuzco. Each of the four provinces was administered by a viceroy or governor. The nation was further subdivided into departments of 10,000 inhabitants, each also administered by a gov.; and there were other subdivisions into various numbers, the lowest of which was ten, and every one of which was ruled by headmen, who were responsible for offenders, and were required to see that those under them enjoyed the rights to which they were entitled. The governors and chief rulers were selected from the Inca aristocracy. The laws related almost wholly to criminal matters, and were few, and remarkably severe. Theft, adultery, murder, blasphemy against the Sun, and burning of bridges, all were capital crimes. The territory of the empire was divided into three portions, and from these portions was derived the revenue that supported the *Sun*, the *Inca*, and the *people*, respectively. The numerous priesthood, and the costly ceremonial of the national worship, were supported by the first; the royal household and the govt. expenditure were defrayed out of the second; and the people, at so much per head, divided the third of these portions. There was a new division of the soil every year, and the extent of land apportioned to each householder was regulated by the numbers in his family. It might be supposed that this arrangement would be fatal to improvement of the soil, and to the pride in and love of home; but this was not the case; and it is probable that, at each partition of the soil, the tenant was, as a rule, confirmed in his occupation. The three divisions were cultivated by the people, the territory apportioned to the Sun being attended to first, that belonging to the people themselves next, and, lastly, the division belonging to the Inca. The labor on the Inca's share of the land was engaged in by the whole population at the same time, and the work was lightened by the national songs and ballads, and the scene made picturesque by the holiday attire of the workers. The manufactures of the country were managed in the same way, the people laboring first in making clothes for themselves, and afterward giving their work to the Inca. The mines were worked by the people, but no one gave more than a certain amount of time to the govt. service (during which time he was maintained at

govt. expense); and after discharging the stipulated amount of duty, he was succeeded by another. Money was unknown among the Peruvians. They were a nation of workers, but they wrought as the members of one family, labor being enforced on all, for the benefit of all.

The national policy of the Peruvians had its imperfections and drawbacks, and, though capable of unlimited extension, it was not capable of advancement. It was in the last degree conservative, and was of such a nature that the introduction of reform in any vital particular must have overturned the whole constitution. Nevertheless, the wants of the people were few, and these were satisfied. Their labor was not more than they could easily perform, and it was pleasantly diversified with frequent holidays and festivals. They lived contentedly and securely under a government strong enough to protect them; and a sufficiency of the necessaries of life was obtained by every individual. Still, in the valleys of the Cordilleras and on the plain of Cuzco may be heard numberless songs in which the Peruvian mourns the happy days of peace, security, and comfort enjoyed by his ancestors. Further, they revered and loved their monarch, and considered it a pleasure to serve him. With subjects of such a temper and inclination, the Incas might direct the entire energies of the nation as they chose; and it is thus that they were able to construct those gigantic public works which would have been wonderful even had they been performed with the assistance of European machinery and appliances.

The Peruvian system of agriculture was brought to its highest perfection only by the prodigious labor of several centuries. Not only was the fertile soil cultivated with the utmost care, but the sandy wastes of the coast, unvisited by any rains, and scantily watered by brooks, were rendered productive by an artificial system of irrigation, the most stupendous, perhaps, that the world has ever seen. Water was collected in lakes among the mountains, and led down the slopes and through the sands of the coast, apparently doomed to sterility, by canals and subterranean passages constructed on a vast scale, and the ruins of which, at the present day, attest the industry, ingenuity, and admirable patience of the Peruvians. The aqueducts, sometimes between 400 and 500 m. in length, were in some cases tunnelled through massive rocks, and carried across rivers and marshes. They were constructed of large slabs of freestone, fitting so closely as to require no cement, and answering perfectly the purpose for which they were intended; for the sandy wastes were converted into productive fields and rich pasture-lands, and the coast teemed with industrious inhabitants. In the valley of Santa there were 700,000 inhabitants; there are now only 12,000: in that of Ancullama, there were 30,000; there are now only 425. The fields on the coast were enriched also with the

manure of sea-fowls, which has since come to be known as guano. Fragments of the aqueducts still remain, and are surveyed with astonishment by the traveller, who wonders that such works could have been constructed by a people who appear to have employed no machinery, had no beasts of burden, who did not know the secret of the true arch, and who did not use tools or instruments of iron. But the triumphs of industry were not more decided on the coast than in the *Sierra*. Here, at elevations visited now only by the eagle and the condor, the rocky heights, riven by innumerable chasms and deeply cut precipices, were crowned with waving crops of wheat and maize. Where the mountain slopes were too steep to admit cultivation, terraces were cut, soil was accumulated on them, and the level surfaces converted into a species of hanging gardens. Large flocks of lamas were grazed on the plateaux; while the more hardy vicuñas and alpacas roamed the upper heights in freedom, to be driven together, however, at stated periods, to be shorn or killed. The wool yielded by these animals, and the cotton grown in the plains and valleys, were woven into fabrics remarkable equally for fineness of texture and brilliancy of color.

The character of the architecture of the Peruvians has been alluded to. The edifices of Incarial times are oblong in shape and built with large polygonal blocks of stone—now known as 'Cyclopean masonry.' Although the buildings of Peru were erected probably about the 12th c. after Christ, they possess an extraordinary likeness to those of the Pelasgi in Europe. This resemblance in style must be accidental, arising probably from the fact that both nations used bronze tools and were unacquainted with iron. The jambs of the doorways slope inward, like those of Etruscan tombs, and have similar lintels. The walls of Cuzco are good examples of this style. It is further remarkable that these walls are built with re-entering angles, like the fortifications which were adopted in Europe only after the invention of gunpowder.

The materials used in P. were granite, porphyry, and other varieties of stone; but in the more rainless regions, sun-dried bricks also were much used. The walls were most frequently of stones of irregular size, but cut with such accuracy, and fitting into each other so closely at the sides, that neither knife nor needle can be inserted in the seams. Though the buildings were not usually more than from 12 to 14 ft. high, they were characterized by simplicity, symmetry, and solidity. The Peruvian architects did not indulge much in external decoration; but the interior of all the great edifices was extremely rich in ornament. In the royal palaces and temples, the most ordinary utensils were of silver and gold; the walls were thickly studded with plates and bosses of the same metals; and exquisite imitations of human and other figures, and of plants, fashioned with perfect accuracy in gold and silver, were always seen in

the houses of the great. Hidden among the metallic foliage, or creeping among the roots, were many forms of brilliantly colored birds, serpents, lizards, etc., made chiefly of precious stones; while in the gardens, interspersed among the natural plants and flowers, were imitations of them, in gold and silver, of such truth and beauty as to rival nature. The Temple of the Sun at Cuzco, called *Coricancha*, or 'Place of Gold,' was the most magnificent edifice in the empire. On the w. wall, opposite the e. portal, was a splendid representation of the Sun, the god of the nation. It consisted of a human face in gold, with innumerable golden rays emanating from it in every direction; and when the early beams of the morning sun fell upon this brilliant golden disk, they were reflected from it as from a mirror, and again reflected throughout the whole temple by the numberless plates, cornices, bands, and images of gold, until the temple seemed to glow with a sunshine more intense than that of nature.

The religion of the Peruvians, in the later ages of the empire, was far in advance of that of most barbarous nations. They believed in a Great Spirit, Creator of the universe, who, being a spirit, could not be represented by any image or symbol, nor be made to dwell in a temple made with hands. They believed also in the existence of the soul hereafter, and in the resurrection of the body. The after-life they considered to be a condition of ease and tranquillity for the good, and of continual wearisome labor, extending over ages, for the wicked. But, while they believed in the Creator of the world, they believed also in other deities, who were of some subordinate rank to the Great Spirit. Of these secondary gods, the Sun was the chief. They reverenced the Sun as the source of their royal dynasty; and everywhere throughout the land, altars smoked with offerings burned in his worship.

About 1516, ten years before the death of Huayna Capac, the first white man had landed on the w. shores of S. America; but it was not till 1532 that Pizarro (q.v.), at the head of a small band of Spanish adventurers, actually invaded Peru. On his death-bed, the great Inca expressed a wish that the kingdom of Quito should pass to Atahualpa, one of his sons by a princess of Quito whom he had received among his concubines, and that all his other territories should fall to his son Huascar, the heir to the crown, and who, according to the custom of the Incas, should have inherited all its dependencies. Between these two princes, quarrels, resulting in war, arose; and when Pizarro entered P., he found the country occupied by two rival factions, a fact of which he took full advantage. Atahualpa had completely defeated the forces of his brother, had taken Huascar prisoner, and was now stationed at Caxamalca, on the e. side of the Andes, whither, with a force of 177 men, of whom 27 were cavalry, the dauntless Spanish leader, 1532, Sep., set out to meet him. For the capture of Atahualpa by

the Spaniards, his subsequent life and violent death, see ATAHUALPA. Shortly after his death at Caxamalca, the foreign adventurers set out for Cuzco. Their strength had been recently increased by reinforcements, and they now numbered nearly 500 men, of whom about a third were cavalry. They entered the Peruvian capital 1533, Nov. 15, having, in their progress toward the city of the Incas, had many sharp and sometimes serious encounters with the Indians, in all of which, however, their armor, artillery, and cavalry gave them the advantage. At Cuzco they obtained a vast amount of gold, the one object for which the conquest of P. was undertaken. As at Caxamalca, the articles of gold were mostly melted into ingots, and divided among the band. Their sudden wealth, however, did many of them little good, as it afforded them the means of gambling; and many of them, rich at night, found themselves again penniless adventurers in the morning. One cavalier, having obtained the splendid golden image of the Sun as his share of the booty, lost it in play in a single night. After stripping the palaces and temples of their treasures, Pizarro placed Manco, a son of the great Huayna Capac, on the throne of the Incas. Leaving a garrison in the capital, he then marched W. to the sea-coast, with the intention of building a town, from which he could more easily repel invasion from without, and which should be the future capital of the kingdom. Choosing the banks of the river Rimac, he founded, about six m. from its mouth, the *Ciudad de los Reyes*, 'City of the Kings.' Subsequently, its name was changed to Lima, the modified form of the name of the river on which it was placed. But the progress of a higher civilization, thus begun, was interrupted by an event which overturned the plans of the general, and entailed the severest sufferings on many of his followers. The Inca Manco, insulted on every hand, and in the most contemptuous manner, by the proud Castilian soldiers, effected his escape, and headed a formidable rising of the natives. Gathering round Cuzco in immense numbers, the natives laid siege to the city, and set it on fire. An Indian force also invested Xauxa, and another detachment threatened Lima. The siege of Cuzco was maintained for five months, after which time the Peruvians were commanded by their Inca to retire to their farms, and cultivate the soil, that the country might be saved from famine. The advantages, many, though unimportant, which the Inca gained in the course of this siege, were his last triumphs. He afterward retired to the mountains, where he was massacred by a party of Spaniards. More formidable, however, to Pizarro, than any rising of the natives, was the quarrel between himself and Almagro, a soldier of generous disposition, but of fiery temper, who, next to Pizarro, held the highest rank among the conquerors. For the insurrection, trial, and death of this chief by execution, see ALMAGRO. The condition of the country was now in every sense deplorable. The natives, astonished

not more by the appearance of cavalry than by the flash, the sound, and the deadly execution of artillery, had succumbed to forces which they had no means of successfully encountering. Meantime, the Almagro faction had not died out with the death of its leader, and they still cherished schemes of vengeance against the Pizarros. It was resolved to assassinate the general as he returned from mass on Sunday, 1541, June 26. Hearing of the conspiracy, but attaching little importance to the information, Pizarro nevertheless deemed it prudent not to go to mass that day. His house was assaulted by the conspirators, who, murdering his servants, broke in on the great leader, overwhelmed him by numbers, and killed him (see PIZARRO). The son of Almagro then proclaimed himself governor, but was soon defeated in battle, and put to death. In 1542 a council was called at Valladolid, at the instigation of the ecclesiastic Las Casas, who felt shocked and humiliated at the excesses committed on the natives. The result of this council was that a code of laws was framed for P., according to one clause of which, the Indians who had been enslaved by the Spaniards were virtually declared free men. It was also enacted that the Indians were not to be forced to labor in unhealthful localities, and that, in whatever cases they were desired to work in any particular locality, they were to be fairly paid. These and similar clauses enraged the adventurers. Blasco Nuñez Vela, sent from Spain to enforce the new laws, rendered himself unpopular, and was seized, and thrown into prison. He had come from Spain, accompanied by an 'audience' of four, who now undertook the government. Gonzalo Pizarro (the last in this country of the family of that name), who had been elected capt.gen. of P., now marched threateningly upon Lima. He was too powerful to withstand, and the audience received him in a friendly manner, and, after the administration of oaths, elected him gov. as well as capt.gen. of the country. The career of this adventurer was cut short by Pedro de la Gasca, who, invested with the powers of the sovereign, arrived from Spain, collected a large army, and pursued Gonzalo Pizarro, who was eventually taken and put to death.

A series of petty quarrels, and the tiresome story of the substitution of one ruling functionary for another, make up a great part of the subsequent history. The country became one of the four vice-royalties of Spanish America, and the Spanish authority was fully established and administered by successive viceroys. The province of Quito was separated from P. 1718; and 1788 considerable territories in the s. were detached, and formed into the govt. of Buenos Ayres. At the outbreak of the War of Independence in S. America, the Spanish govt., besides having much declined in internal strength, was distracted with the dissensions of a regency, and torn by civil war; nevertheless, 1820, the Spanish viceroy had an army of 23,000 men in P., and all the large

towns were completely in the hands of Spanish officials. P. was the last of the Spanish S. American possessions to set up the standard of independence. 1820, Aug., a rebel army, under Gen. San Martin, one of the liberators of Chili, sailed for P.; and after a number of successes, both on sea and land, in which the patriots were most effectively assisted by English volunteers, the independence of the country was proclaimed 1821, July 28, and San Martin assumed the protectorate of the young republic. From this date to 1860, under various titles, 21 rulers have held sway. For the first 24 years of its existence as an independent republic, the country was distracted and devastated by wars and revolutions. In 1845 Don Ramon Castilla was elected president; and under his firm and sagacious guidance, the country enjoyed an unwonted measure of peace, and became regularly organized. Commerce began to be developed, and important public works were undertaken. The term of his presidency ended 1851, in which year Gen. Rufino José Echenique was elected president. The country, however, was discontented, and Castilla again found himself, 1855, at the head of affairs. Slavery, which, though abolished by the charter of independence, still existed, was ended by a decree dated 1854, Oct. In 1863, Aug., a quarrel had taken place at the estate of Talambo, in the n., between some Basque emigrants and the natives, in which several of the disputants were killed or wounded. Taking advantage of this occurrence, the Spanish govt. sent out a 'special commissioner' in the spring of 1864, to complain of injuries sustained by Spaniards. The 'commissioner' left Lima Apr. 12; and on the 14th, a Spanish squadron, under Admiral Pinzon, took forcible possession of the Chincha Islands. The European consuls protested loudly against this outrage, and the Peruvians were greatly excited. War was, however, averted, Pres. Pezet being unwilling to risk hostilities with Spain; and 1865, Jan., a treaty of peace was signed. This did not lead, however, to internal peace. The pres. was declared a traitor by the assembly in the same month that saw the treaty of peace ratified in the Spanish capital. Gen. Canesco, after a severe struggle, assumed the presidential authority, and retained it till Nov., when Col. Prado was nominated temporary dictator. The obnoxious treaty was now rejected, and P. entered 1866, Jan., into a treaty, offensive and defensive, with Chili (q.v.), which country was then at war with Spain; but this led to no serious consequences to P.—an unsuccessful attack on Callao having vindicated Spanish honor. In Oct., Gen. Prado was regularly elected president, and 1867, Feb., he recommended a new constitution, according to which there is a senate of 44 members and a house of 110 representatives. Prado had to resign 1868; his successor, Balta, was assassinated 1872; Pardo, who was pres. till 1876, was succeeded by Prado. Under Pardo, the country had been peaceful and prosperous, and education had been greatly extended. In

1879 P., as the ally of Bolivia, became involved in war with Chili. The war was carried on desultorily 1879 and 80 : Arica was besieged and taken ; the most powerful Peruvian iron-clads were sunk or captured ; finally, 1881, Callao and Lima were taken and occupied by the Chilians. The victors imposed on the vanquished the severe terms above stated, and held possession of the country till the ratification of the treaty of peace, 1883, Oct. 22. Then ensued a period of national unrest, caused in part by local and political disturbances, but more particularly by the burden of the foreign debt. This was held in countries with which P. desired the friendliest relations ; but with the chief source of her revenue taken away by the treaty of peace, and with an increasing and pressing home debt, her financial condition appeared hopelessly complicated. In 1886 William R. Grace, of New York, representing the European bondholders of P., submitted a proposal to the govt. for the cancellation of part of the foreign debt in return for various railroad concessions. Dr. Aranibar was chosen commissioner of P. to treat with Mr. Grace. As the negotiations progressed, their range increased. The bondholders pooled their interests, formed a syndicate, and made a formal proposition to the govt. of P. to assume the payment of the entire national debt for concessions to it covering a period of 66 years. A contract to carry out the provisions of the proposal was drawn, and, after long discussion in the Peruvian congress, was formally approved by it 1889, Oct. 25. The foreign debt then amounted to $160,000,000, and the internal to $100,000,000, both with interest long defaulted. Chili was made a party to the contract, and signed a protocol, under which she agreed to restore the Lobos Islands to P. and to return 80 per cent. of the proceeds of the sales of guano since 1882, Feb. Under the joint contract, P. was released from responsibility for the loans of 1869, 70, and 72, nearly all of which was incurred in railroad construction ; and the syndicate took possession of the roads for 66 years, agreeing to complete and operate them and return them to P. at the end of that period. The various roads aggregated about 769 m. The govt. ceded the syndicate, with the consent of Chili, the guano beds at Tarapaca, Huanillos, Pabellon de Ica, Punta de Lobos, and wherever else guano may be found, to the extent of 3,000,000 tons, reserving for home consumption the beds of the Chincha Islands. If the syndicate fail to find the specified amount of guano, P. is not responsible ; but as soon as the amount is found, all the beds are to be restored to the govt. The govt. also ceded the right of navigation on Lake Titicaca ; franchises for valuable mines that could not be worked without further railroad extensions ; 5,000,000 acres of public land, and, for the extension of the railroads to the Bolivian frontier and to the head of navigation on the Amazon river, an additional 15,000 acres for each kilometer of railroad finished ; and the right to use free of expense all the moles or landing-

places at the different ports. The only cash consideration imposed on the govt. by the contract was the payment to the syndicate, for the bondholders, of $400,000 per annum for 33 years. Chili ceded, nominally to Peru and really to the syndicate, the guano that she held by treaty for the joint benefit of herself and Peru, equivalent to about $10,000,000, to aid Peru in settling with the foreign bondholders, and to relieve herself of any claim by the bondholders on the province of Tarapaca, which she took from Peru, and which the bondholders claim was hypothecated to them by Peru as security for the debt. After the approval of the contract by the congress of Peru, the syndicate organized a joint-stock company, under the title of the Peruvian Corporation, with a capital of $80,190,000; and 1890, Apr., all of its first issue of $7,500,000 debentures was subscribed within a week. In 1903 the Peruvian minister at Washington stated that 'in 1890 our foreign debt was cancelled.' The present debt of Peru is $15,266,000.

The last few years have been peaceful: for the first time in the history of the republic two consecutive changes of administration were effected without disturbance of the public order. On 1901, Nov. 25, an agreement was made with Bolivia for the settlement of boundary disputes by arbitration. On 1903, Aug. 18, Congress proclaimed Don Manuel Cándamo duly elected president for the four years beginning 1903, Sept. 8. On 1904, Sep. 13, Don José Pardo was proclaimed president and on May 27, 1908, Augusto B. Leguia was elected to that office.

PERU: city in La Salle co., on the n. bank of the Illinois river; on the Chicago, Rock Island and Pacific, the Chicago, Burlington and Quincy, railroads, 100 m. w. of Chicago. Steamboats ascend the river to Peru where the Illinois and Michigan Canal begins. The industries of Peru include zinc works, the making of pumps, boilers, scales, agricultural implements, beer, clocks and tiling. There are several churches, graded schools, newspapers and banks. The streets are well paved, graded and lighted by electricity. Public parks are provided. The zinc works is the leading industry, several hundred men being employed. A big force is constantly engaged in the manufacture of modern farming implements. St. Bedie's R. C. College is at Peru. Pop. 7,000.

PERU': city, cap. of Miami co., Ind.; on the Lake Erie and Western and the Wabash railroads, and on the Wabash river; 75 m. n. of Indianapolis. There are several churches, schools and daily and weekly newspapers, national banks, and hotels. It is in a rich agricultural district, and has manufactures of steel, electrical appliances, refrigerators, sewing-machines, carriages, baskets, and woolen goods. There are foundries, railroad shops, and a planing-mill. The streets are lighted by gas, and there is a system of water-works. Pop. (1900) 8,463.

PERU'GIA: city of central Italy, cap. of the province of P. (formerly Umbria), 1,550 ft. above sea-level, on a hill 800 ft. high, on the right bank of the Tiber, 10 m. e. of the Lake of P. (anc. *Lacus Trasimenus*), 84 m. n. of Rome. It is surrounded with walls pierced with numerous gates, of which the *Arch of Augustus* (named from the inscription *Augusta Perusia* over it, inscribed by Augustus) is the finest. It is the see of a bishop, and contains more than 45 churches and many monastic establishments. Its streets are wide, and there are several squares lined with massive buildings. The broad Corso, which contains the finest edifices, unites two squares, one of which is occupied by the Duomo, or cathedral, dedicated to San Lorenzo, and dating from the end of the 15th c. It is in a fine bold Gothic style, and contains many excellent paintings, carvings, etc. Many of the churches and convents are noble Gothic structures, and all are more or less famous for their pictures, some of which are by Raphael, Perugino, and other great masters. In the vicinity of the city, a number of tombs, supposed to mark the site of the necropolis of ancient P., were discovered 1840. The tombs contain numerous beautiful *cinerary urns*, in marble and travertine; and lamps, vases, bronze armor, ornaments, pateræ, etc., also were found, but have mostly been removed to a neighboring villa. The Univ. of P., founded 1320, is not one of the 17 state universities, but is supported by the province. It has various museums, and a library of 80,000 vols., with some valuable MSS. The attendance is not numerous. Besides the picture-gallery of the Acad. of Fine Arts, there are numerous private art-collections. P. contains many interesting palaces, a beautiful fountain, an exchange, theatres, etc. Velvets, silk stuffs, woolen goods, soap, brandy, and liquors are manufactured; and there is considerable trade in corn, oil, wool, wine, and cattle. Pop. (1901) 61,385.

P., anc. *Perusia*, was one of the 12 Etrurian republics. It became tributary to Rome B.C. 294. During the war between Mark Antony and Augustus, it was taken by the latter, and was burned down. It was captured by the Goths under Totila at the fall of the Western Empire. Under Pope Paul III., it was united to the Papal States. In 1860 it became part of the kingdom of Italy under Victor Emanuel.

PERU'GIA, LAKE OF: see TRASIMENUS LACUS.

PERUGIA, *pā-rȯ́jȧ*, known also as UMBRIA, *ŭm'brĭ-ȧ:* province in central Italy; 3,720 sq. m. The surrounding provinces are Arezzo, Pesaro ed Urbino, Ancona, Macerata, Ascoli-Piceno, Aquila, Rome, and Siena. The Apennine range passes through the n. and e., and there are numerous spurs in other portions. The Tiber flows through the province, and there are numerous valleys and plains which are very productive. Much of the wood and lumber used in Rome is obtained from P. Large numbers of cattle and sheep

are kept, and bees and poultry receive much attention. Fruit-growing is a prominent industry, and considerable corn is produced. There are manufactures of woolen, cotton, and silk. The province is divided into districts; cap. Perugia. The famous battle between the Romans and Hannibal was fought probably in this province.—Pop. (1891) 595,579; (1901) 667,210.

PERUGINO, *pā-rô-jē′no*, PIETRO (real name PIETRO VANNUCCI, *pē-ā′tro vâ-nôt′chē*): 1446–1524: celebrated Italian painter: b. Citta della Pieve, in Umbria; but having afterward established himself in the neighboring and more important city Perugia, where he had the right of citizenship, he is commonly called Il Perugino. It is generally thought that he studied under Andrea Verrocchio at Florence. He executed numerous excellent works in various cities, particularly in Florence, Siena, Pavia, Naples, Bologna, Rome, and Perugia. Sixtus IV. employed him in the Cappella Sistina; and his fresco of *Christ Giving the Keys to Peter* is by far the best of those painted on the side-walls of that chapel. He, with contemporary painters, decorated the Stanze of the Vatican; and his works there are the only frescoes that were spared when Raphael was commissioned to substitute his works for those formerly painted on the walls and ceilings. The fact of his having had Raphael for his pupil has no doubt in one way increased the reputation of P., but it has also in some degree tended to lessen it, as, in many of P.'s best productions, the work of Raphael is confidently pointed out by connoisseurs, and, indeed, many important pictures, at one time acknowledged as his, are now ascribed to his great pupil. His high standing as a painter, however, is established by many admirable works, in which no hand superior to his own could have operated; and, with the exception, perhaps, of Francia, who in some respects is esteemed his equal, he is now acknowledged as the ablest of the masters of that section of the early Italian school in which religious feeling is expressed with great tenderness, in pictures remarkable for delicate execution. P.'s works are distinguished also by rich and warm coloring. An excellent example of this master's work is in the collection of the National Gallery, London—'No. 288. *The Virgin Adoring the Infant Christ.* P.'s reputation was high, when the introduction of the cinquecento style, by Leonardo and Michelangelo, tended to throw into the shade the art of the earlier masters. Disputes ran high between the leaders of the old and new styles, and Michelangelo is said to have spoken contemptuously of P.'s powers. This, of course, has biassed Vasari's opinion in his estimate of the opponent of his idol, but P.'s reputation now stands very high, and his works are greatly esteemed. Raphael was about 12 years of age when he was entered as a pupil with P., who was then (1495) engaged on the frescoes in the Sala del Cambia (the Exchange) at Perugia. P died at Castello di Fontignano, near Perugia.

PERUKE, n. *pĕr-ôk′* [F. *perruque*—from It. *perruca;* Sp. *peluca*, a wig (see PERIWIG)]: a wig. PERUKED′, a. *-ôkt′*, covered or fitted with a wig. PERUKE-MAKER, a wig-maker. *Note.*—The connection is formed between the It. and Sp. by remembering that *r* and *l* are interchangeable. The primary meaning was probably 'a mass of hair separated from the head'—see Skeat.

PERULA, n. *pĕr′ū-lă*, or PERULE, n. *pĕr′ūl*, PER′ULÆ, n. plu. *-lē* [L. *perula*, a little pocket—from L. and Gr. *pēra*, a bag or wallet]: in *bot.*, a sac formed in some orchids by the prolonged and united bases of two of the segments of their perianth; the cap-like covering of buds formed by the abortion of their outer leaves.

PERUSE, v. *pĕ-rôz′* [the origin of this word is uncertain, but it may be connected with L. *pervīsus*, looked through, examined—from *per*, through; L. *vīsum*—from *video*, I see: F. *viser*, to look at, to view]: to read with attention; to read through; in *OE.*, to observe; to examine; to survey. PERU′SING, imp. PERUSED, pp. *pē-rôzd′*. PERU′SER, n. *-zẽr*, one who reads with attention, as a book. PERU′SAL, n. *-ô′zăl*, the act of reading; the careful examination, as of a book. *Note.*—Skeat may be right when he affirms that PERUSE is coined from *per* and *use*, and that the primary sense was 'to use carefully,' and then acquiring the curious change to the senses, 'to survey, to read.'

PERUVIAN, a. *pē-rô′-* or *pĕr-ô′vĭ-ăn:* of or pertaining to *Peru:* N. a native of Peru. PERUVIAN BALSAM, or BALSAM OF PERU, thick brown glutinous liquid of fragrant odor and pungent bitter taste, product of a leguminous tree growing in limited parts of S. America; introduced into Europe about 1527, as a remedy in bronchial and pulmonary diseases, and for wounds and ulcers. PERUVIAN GOOSEBERRY (see PHYSALIS). PERUVINE, n. *pē-rô′-* or *pĕr-ô′vĭn*, a light oily fluid obtained from the balsam of Peru.

PERUVIAN BARK: bark of various cinchona trees (see CINCHONA). These trees were introduced by the E. India Co. into Brit. India 1861, being planted chiefly on the Neilgherry Hills, partly on the mountains of Ceylon and the Himalaya: from these stations they have been diffused throughout the Madras presidency. Several years since there were about 2,700,000 cinchona-trees on the govt. plantations. Markham, agent of the E. India Co. in this introduction, in all his travels saw only one Peruvian Bark tree which had been planted by the hand of man. (See Markham's *Travels in Peru and India*, 1862.)

PERUWELS, *pā′rü-vĕls:* town of Belgium, province of Hainault, with breweries, lime-kilns, and some linen manufactures. Pop. 8,000.

PERUZZI, *pā-rôt'sē*, BALDASSARE DA SIENA: architect and painter: 1481–1536; b. Ancajano, Italy. He studied architecture and painting at Rome. He became famous as designer of the Farnesina, a villa erected on the Tiber for a wealthy Roman banker, who became his liberal patron. This structure is noted for beauty of design and for its frescoes by Raphael, P., and other famous artists. The noted frescoes in San Onofrio, attributed sometimes to a contemporary, were painted by P. Pope Leo X. appointed him architect of St. Peter's 1520; but seven years later, when Rome was invaded, he lost his property and was taken prisoner. Escaping to Siena, he was appointed architect of the city, and designed its defenses. He afterward returned to Rome and designed several palaces, but lived in poverty, and is supposed to have been poisoned by a competitor. He was buried in the Pantheon. He probably invented the form of architectural perspective painting which was improved by Del Pozzo; was a good classical scholar and an able scientific engineer. One of his drawings, the *Adoration of the Magi*, in which the three kings are represented by portraits of Michelangelo, Raphael, and Titian, is in the English National Gallery.

PERVADE, v. *pėr-vād'* [L. *pervādĕrĕ*, to spread through, to penetrate—from *per*, through; *vādo*, I go]: to pass or spread through the whole extent of a thing; to be diffused through every minute part. PERVAD'ING, imp. PERVAD'ED, pp. PERVA'SIVE, a. *-vā'sĭv* [L. *pervāsus*, passed or spread through]: tending or able to pervade. PERVA'SION, n. *-zhŭn*, the act of pervading or passing through.

PERVERSE, a. *pėr-vėrs'* [F. *pervers*—from L. *perversus*, overturned, overthrown—from *per*, thoroughly; *verto*, I turn: It. *perverso*]: stubborn; untractable; continuing in wrong-doing; petulant; vexatious. PERVERSE'LY, ad. *-lĭ*. PERVERSE'NESS, n. *-nĕs*, or PERVER'SITY, n. *-sĭ-tĭ* [F. *perversité*—from L.]: the state of being perverse; disposition to thwart or cross. PERVER'SION, n. *-shŭn* [F. —L.]: the act of perverting; change to something worse; diversion from the true intent or object. PERVER'SIVE, a. *-sĭv*, tending to corrupt or pervert.—SYN. of 'perverse': froward; ungovernable; untoward; peevish; cross; distorted; obstinate.

PERVERT, v. *pėr-vėrt'* [F. *pervertir;* L. *perver'tĕrĕ*, to overturn, to overthrow—from *per*, thoroughly; *verto*, I turn: It. *pervertere*]: to corrupt; to turn from the true use, end, or purpose: N. *pėr'vėrt*, one who has changed to the worse—generally said of one who is believed to have changed from the true religion to a false one, or to a corrupt form of the true. PERVERT'ING, imp. PERVERT'ED, pp. PERVERT'ER, n. *-ėr*, one who corrupts. PERVERT'IBLE, a. *-ĭ-bl*, capable of being perverted.—SYN. of 'pervert, v.': to distort; misinterpret; convert; proselytize;—of 'pervert, n.': convert; proselyte; neophyte.

PERVIOUS, a. *pėr′vĭ-ŭs* [L. *pervĭus*, having a passage through—from *per*, through; *vĭa*, a way]: that may be penetrated by another body or substance; admitting passage; penetrable by the mind. PER′VIOUSLY, ad. *-lĭ*. PER′VIOUSNESS, n. *-nĕs*, the quality of admitting a passage through.

PESADE, n. *pē-sād′* or *-zād′* [F. *pesade*, motion of a horse in riding; *peser*, to weigh—from L. *pensare*]: the motion of a horse raising his fore quarters without moving his hind feet.

PESARO, *pā′sâ-rō* (anc. *Pisaurum*): town of central Italy, province of Pesaro and Urbino, on a rocky wooded hill, on the right bank of the Foglia, 1 m. from the mouth of that river in the Adriatic; 20 m. n.e. of Urbino. Its streets are broad, and it is surrounded by walls and defended by a citadel. It is a bishop's seat, and contains a cathedral and other churches. The country in the vicinity is fruitful and beautiful; the figs of the district being esteemed the best in Italy. The port cannot now accommodate vessels of more than 70 tons burden; but is large enough for 200 vessels of light draught. Silks, pottery, glass, and leather are manufactured; and there is active trade in silk, hemp, and woolen goods. Pop. (1901) 25,103.

PESARO-ED-URBINO, *pā′sâ-rō-ĕd-ôr-bē′nō:* province of Italy, s. of the Adriatic, n. of Perugia, with Forli and Tuscany on the w., and Ancona and the Adriatic on the e.; about 1,150 sq. m. The surface is broken by mountain ranges, but the valleys are fertile and are well cultivated. Flax, hemp, and various kinds of grain, are grown; and large quantities of grapes and olives are produced. Some of the finest silk of Europe is obtained from this province. Many bees are kept, and on the fine hill-pastures large numbers of cattle and sheep are maintained. Cap. Pesaro.—Pop. of province (1872) 213,072; (1890) 232,438; (1901) 253,982.

PESCADORES (ISLANDS): see FORMOSA.

PESCHIERA, *pĕs-kē-ā′râ:* frontier town and fortress of the kingdom of Italy, and a member of the famous Quadrilateral (q.v.); partly on an island in the channel of the Mincio, partly on the right bank of that river, at its outlet from the Lake of Garda. The town itself is a poor place of less than 2,000 inhabitants. P. commands the right bank of the river, and in connection with it is the extensive work called the 'Salvi,' which covers the approaches of the river in that direction. During the French republican war, P. was a simple pentagon. Its fortifications, however, were greatly strengthened by the Austrians. It is defended by walls and by forts, lunettes, fosses, and a covered-way; and its main purpose, besides that of forming an intrenched camp capable of accommodating a large number of troops, is to harass an army attempting to cross the Mincio by Goito or Valeggio. In the island portion of the town are extensive barracks, forming three sides of a square. P. is a

station on the Milan and Venice railway, and is a station also of the Austrian govt. steamers that ply on the Lake of Garda. P. was taken by the Piedmontese under King Charles Albert 1848, and was again invested by them 1859, June, after the battle of Solferino. The treaty of Villafranca, however, 1859, July 11, relieved P. from a siege.

PESHAWAR, or PESHAWUR, *pĕsh-ow'ėr* or *pĕ-shaw'-wėr:* important town, near the n.w. 'scientific' frontier of India; cap. of the province of P.; 18 m. e. of the e. extremity of Khyber Pass, 150 m. e.s.e. of Cabul. It is defended by a bastioned wall, and commanded by a fort, the fear of which prevents internal disturbances. At the beginning of the 19th c., P. had 100,000 pop. Under the stern rule of the Sikhs, its trade languished, and its splendid mosques, many of them in the richest style of oriental architecture, fell into decay. It is on the route from Hindustan to Cabul and Khorassan by the Khyber Pass, and is the seat of a British garrison, maintained here to preserve the security of the route. Under British protection, the town has revived, trade has become more active, and the appearance of the suburbs and environs is improved. Pop. (1891) 83,930; (1901) 95,147.

The *district* of P., included in the Punjab, and formerly a portion of Afghanistan, has 1,929 sq. m. It is exceedingly fruitful. Pop. 523,152.—The *division* of P., which includes the dist. of P. and two others, has 8,381 sq. m.; pop. 1,181,289; (1891) 1,421,210.

PESHITO, rather PESHIT'TO, *pĕ-shē'tō* [Syr. 'simple,' 'plain,' sc. Version]: cursive variety of the old Phœnician alphabet. The term is used as the designation of the earliest and the authorized Syriac Version of the Old, and the greatest part of the New Test. This version holds among Syrian Christians the same place as the Vulgate in the Roman, and the 'Authorized Version' in the English Church. Many are the traditions about its origin. Thus, the translation of the Old Test. is supposed to date from the time of Solomon and Hiram; or to have been done by Asa the priest; or to date from the time of the Apostle Thaddæus (Adæus), and Abgar, King of Osrhœne, in the 1st c. after Christ. To the same period is supposed to belong also the translation of the New Test., which is ascribed to Achæus, disciple of Thaddæus, the first Edessian bishop and martyr. Recent investigation has come no nearer to any result than to place the latter translation vaguely in the 2d and the former in the 3d c., and to make Judaic Christians authors of both. Ephraem Syrus (q.v.), who wrote in the 4th c., certainly speaks of the Peshito as *Our* Version, and finds it even then necessary to explain some of its terms, which had become obsolete. Five books of the New Test. (the Apocalypse and four of the Epistles) are lacking in all the MSS., having probably not yet formed part of the canon when the translation was made. The version of the Old Test. was made direct from the Hebrew and by men imbued with the Palestinian mode of explanation. The Peshito of the Pentateuch was used in the Palestinian synagogues until superseded by Aquila's translation and in Babylon in the 3d c. by the Targum of Onekelos, which was based on the Peshito. It is extremely faithful, and astonishingly free from any of those paraphrastic tendencies which pervade more or less all the Targums or Aramaic versions. Its renderings are mostly very felicitous, and coincide in many places with those of the Septuagint; which fact has given rise to the erroneous supposition that the Septuagint itself had been drawn upon. Its use for the Old Test. is more of an exegetical, for the New Testament more of a critical, nature. An edition of the Peshito worthy of its name is still as much a desideratum as is a critical edition of the Septuagint or the Targums; consequently investigators have as yet reached only hazy conclusions respecting some very important questions connected with it. The *editio princeps* of the New Test. part dates Vienna 1555; that of the Old Test. is contained in the Paris Polyglot of 1645. Several portions of the Peshito have been translated again into Arabic. The Syriac translation of those parts of the New Test. which are not found in the Peshito, but are now incorporated into the Syriac Bibles, are of late and uncertain date.

PESO, n. *pā'sō* [Sp.]: a dollar—term used in the Spanish states of S. America.

PESSARY, n. *pĕs'săr-ĭ* [It. *pessario:* F. *pessaire*—from L. *pessus*]: a small instrument made of gutta-percha or glass, introduced into the vagina for supporting the uterus in cases of prolapse or backward or forward displacements.

PESSIMISM, n. *pĕs'sĭ-mĭzm* [F. *pessimisme*—from L. *pessimus*, worst]: doctrine that the world is the worst possible world; doctrine that the universe by its inherent law tends toward the non-existence whence it sprang: disposition to look on the worst side of everything. PES'SIMIST, *-mĭst*, one who holds the theories, or exercises the disposition, of pessimism.—*Pessimism* is popularly a melancholy or severely critical view of the world and its affairs. It is the antithesis of OPTIMISM [L. *optimus*, best], which is an unthinking genial view of life, or an unquestioning dismissal of its problems with the assumption that 'whatever is, is right;' or else, more doctrinally and more reasonably, the conclusion that Infinite wisdom and goodness underlie all the perplexities of existence. Between the two positive extremes is a vague provisional medium, MELIORISM [L. *melior*, better] (named by 'George Eliot'), a hopeful belief that, though the struggle of existence has thus far been full of suffering and waste, there is a tendency to something better. Pessimism has been brought out as a philosophical system, since 1819, in the works of Schopenhauer and Von Hartmann; but the problem of evil, natural and moral, has given a tinge of Pessimism to ancient writings and systems, appearing, e.g., in the discussions in the Book of Job, in the record by Solomon of his apostasy as given in the Book of Ecclesiastes; and, egotistically, in the motto of epicureanism, 'Let us eat and drink, for to-morrow we die.' Extremes meet; and asceticism in all its forms, in all ages, only draws an opposite inference from the same premises: life is vanity, therefore let us abstain from enjoyments. Brahminism and its offshoot, Buddhism, alike regard the changeful world as one only of sorrow, and existence as vain and evil. Buddhism finds the cause of evil to be in desire, which, together with all thought, may be annihilated by repression and self-mortification, until a practical death in life is attained, the Nirvâna, which is perfected at bodily death. Unlike this, the asceticism that grew out of the reasonable self-denial inculcated by Christianity, and its antagonism to worldliness, had in view the blessedness of loving and obeying God, and the purification of the human spirit for a higher life. And while Christianity admits that 'the whole creation travaileth together until now,' it is waiting for a glorious redemption. The philosophical Pessimism of Schopenhauer was connected with German philosophies that sought the primary principle of being, and made it attain to consciousness only in man. This he affirmed to be *Will*, instead of reason or thought; but, in a peculiar

sense, a craving toward life and objective existence, without aim. This developed the brain, as one among other things that feed desire; but brain develops at last a rational intelligence that emancipates man from the craving and suffering which sum up nature. We find a momentary rest in the non-utilitarian and hence unselfish enjoyment of art ideals. The only permanent beatitude begins when one gives up the *will to life* in its lower sense—that is, in the order of nature, where no true happiness is possible; and renouncing egoism, even the very principle of individuality, identifies himself with the good and the suffering of every creature, cultivates active love to others, and, above all, keeps the vow of chastity. This is the religion adopted by Tolstoï, with a Christian acknowledgment and coloring. It is the higher rational and spiritual life, *versus* the lower life of subjection to sense, where no happiness is; it even ignores happiness as the true aim of life. Schopenhauer excited little attention before about 1865; meanwhile another form of Pessimism had its day—the cynicism or the plaintive sentimentality of the romantic school. Later, the first effect of Darwinism was unfavorable to theism; indeed, without a theistic interpretation, the 'struggle of existence' and the animal side of man offer a somewhat pessimistic view. In 1869 appeared Eduard von Hartmann's *Philosophy of the Unconscious.* He may be classified as an optimist-pessimist, holding that the world is the best *possible,* but miserable at best; and that the unconscious intelligen e and will in nature, when it becomes sufficiently accumulated in man, will decree the world out of existence. The question, Is life worth living? can find no sure and final answer in weighing the joys of the present existence against its miseries.—See J. Sully's *Pessimism: a History and a Criticism* (1877), written from the naturalistic point of view; Tulloch's *Modern Theories in Philos. and Religion* (1884); Schopenhauer's *Die Welt als Wille und Vorstellung* (1819); Von Hartmann's *Philosophie des Unbewussten* (1869); *Is Life Worth Living?* by William H. Mallock (1879).

PEST, n. *pĕst* [F. *peste,* a plague, a pest—from L. *pestis,* a deadly disease: It. *peste*]: anything pestilential disease; a plague; anything destructive or very mischievous; bane. PEST-HOUSE, an infirmary or hospital for pestilential diseases.

PESTALOZZI, *pĕs-tâ-lŏt'sē,* JOHANN HEINRICH: 1745, Jan. 12—1827; b. Zürich; of a family belonging to the middle-class gentry. He was destined for the Christian ministry, but turned aside first to the study of law; but the perusal of Rousseau's *Émile,* and the unsatisfactory political condition in which he found Europe, united to disgust him with the artificial life of cities, and he removed to the country, to engage in farming. Purchasing some waste land (after he had acquired the necessary

experience), he applied himself successfully to its cultivation, marrying about the same time the daughter of a wealthy merchant. His mind continuing to be disturbed by the unhappy condition of the masses of the people, he applied himself, during the intervals of his work, to consider means for their elevation, and became convinced that sound education was the remedy for the many evils which infested society. To give effect to his theories, he converted his own house into an orphan asylum, and endeavored, by judicious blending of industrial, intellectual, and moral training, to afford a specimen of sound education, so contrived as to be practicable as a national scheme. His benevolent enterprises involved him, after 15 years (1775–90), in bankruptcy. The failure of his plans, and the democratic tendency of his opinions, brought on him much contempt and opposition. His only consolation was having saved from degradation and neglect more than 100 children, and having issued several volumes on education, containing the results of his experience, and his hopes for the future of the masses. Many subsequent attempts to found schools and to give a specimen of rational scholastic training were made by P., with varying educational success, but with invariable pecuniary embarrassment. His writings, meanwhile, increased in number and importance. The great idea which lay at the basis of his method of intellectual instruction was, that nothing should be treated of except in a concrete way. *Objects themselves* became in his hands the subject of lessons tending to the development of the observing and reasoning powers—not lessons about objects. In arithmetic, he began with the concrete, and proceeded to the abstract; and into the teaching of writing, he was the first to introduce graduation. His special attention, however, was directed to the moral and religious *training* of children, as distinct from their mere *instruction;* and here, too, a graduated progress and a regard to the nature and susceptibilities of children were conspicuous features of his system. Almost all P.'s methods are now substantially adopted by the instructors of elementary teachers in the normal schools of Europe and the United States; and to no man perhaps has primary instruction been so largely indebted. He died at Brugg, in the canton of Basel, amid mortifications and disappointments.

PESTER, v. *pĕs'tėr* [OF. *empestrer*, to pester, to entangle; F. *empêtrer:* perhaps connected with It. *impastricciare*, to bedaub, to beplaster—the figure being that of clogging or entangling in something pasty or sticky]: to trouble; to annoy; to harass with little vexations; in *OE.*, to encumber. PES'TERING, imp. PES'TERED, pp. *-tėrd*, troubled vexatiously; in *OE.*, encumbered. PES'TERER, n. *-ėr*, he or that which pesters. *Note.*—Brachet's ingenious derivation of the F. *empêtrer* from L. *pastorium*, a clog for horses, is probably correct, the proper signification of *empêtrer* being 'to hobble a horse while he feeds afield.'

PESTH.

PESTH, *pĕst:* most thickly settled co. of Hungary, and second in size; in central Hungary, with the Danube on the w. and the Theiss on the e.; 4,196 sq. m. Except a tract near the Danube, the surface is mostly level and the soil somewhat sandy. In the mountainous region grapes are largely cultivated; in other portions the live-stock interest predominates. The pop. comprises Magyars, Slovaks, Germans, and Jews. A number of islands in the Danube belong to P. Budapest, Kecskemet, Körös, and Waitzen are the principal towns.—Pop. of P. 775,030.

PESTH, *pĕst:* most populous and important commercial city of Hungary, on the left bank of the Danube, opposite Buda (q.v.), 171 m. e.s.e. of Vienna by railway. It occupies a low and level site, and contrasts strongly with the antique, picturesque, and rock-built Buda, on the other side of the river. The two cities are connected by a magnificent suspension-bridge, erected 1849, and spanning a water-way of about 1,500 ft. The official name of the united cities is, since 1872, compounded in the form *Budapest.* Along the P. side of the river runs a wide quay, paved and terraced, and backed by a handsome row of buildings, 1½ m. long. The city comprises five divisions—the Inner, Leopold, Theresa, Joseph, and Francis towns. The Inner town, on the bank of the Danube, is the oldest; the other divisions surround it in a semicircle. P. is the seat of the chief judicial courts of Hungary. Its univ., founded at Tyrnau, was transferred to Buda 1780, and thence was removed hither 1784. It is richly endowed, and is attended by more than 2,000 students; the professors and other teachers number 140. Attached to it are a museum, a botanic garden, an observatory, and a library of more than 100,000 vols., with 1,600 MSS. besides. A handsome new chemical laboratory was opened 1872; and in the same year a decree was passed that a new military acad. should be opened, of which the teaching staff numbers 24. Of the chief buildings and institutions, the principal are the synagogue, a large and beautiful structure, completed 1857; the New Buildings (*Neugebäude*)—an immense edifice, now used as barracks and as an artillery depot; the gymnasium; military school; acad. of arts; national museum, with a library of 200,000 vols., and valuable collections of coins, medals, and antiquities; veterinary school; the national and other theatres; and the Hungarian Scientific Soc. The town contains several important silk-spinning factories; and the principal articles of manufacture are silk, cotton, leather, jewelry, and musical instruments. Distilling of brandy, and grinding of grain into meal and flour, are among the most important industries. Four great fairs annually draw here a concourse of more than 30,000 strangers; and exchanges, in value more than 32,000,000 florins, are made. P. was made one of the caps of the empire and seats of imperial residence 1892, June 8. After Vienna, P. has the greatest trade of any city on the Danube. Pop. of Budapest (1900) 732,322.

Pesth is mentioned for the first time in the 12th c.; but though one of the oldest towns in Hungary, its importance dates only from the reigns of Maria Theresa and Joseph II. It was desolated by the Mongols in the 13th c.; and after the battle of Mohacs (q.v.), it fell into the hands of the Turks, who held it till 1686. At the beginning of the 18th c., it was an inconsiderable town, and has risen into importance only in the last 150 years. It has suffered much from inundations of the Danube, by one of which (1838) 2,280 houses were destroyed. 1849, May, while Görgei, with an army of 40,000 Hungarians, occupied the heights above Buda, and bombarded the fortress, which was held for the imperial govt. by Gen. Hentzi, the latter general retaliated by bombarding Pesth; but on the night of May 20, the Hungarians stormed and took the fortress; and on the following morning raised above its battlements the standard of revolt. On the field of Rákos, in the vicinity, where the great national assemblies of the Maygars used to be held, horse-races, on the English model, now take place annually.

PESTIFEROUS, a. *pĕs-tĭf'ĕr-ŭs* [L. *pestis*, a deadly disease; *fero*, I carry]: bearing or bringing pestilence, moral or physical; malignant; destructive. PESTIF'EROUSLY, ad. *-lĭ*.

PESTILENCE, n. *pĕs'tĭ-lĕns* [F. *pestilence*—from L. *pestilen'tĭa*, an infectious or contagious disease—from *pestis*, a deadly disease: It. *pestilenzia*]: any contagious and malignant or mortal disease; the plague: anything sweepingly destructive. PES'TILENT, a. *-lĕnt* [F.—L.]: destructive to health and life; noxious to morals or society; corrupt; as applied to persons, troublesome; mischievous. PES'TILENTLY, ad. *-lĭ*. PES'TILENTIAL, a. *-lĕn'shăl*, tending to produce a pestilence or an infectious disease; destructive; pernicious, physically or morally; offensively troublesome.

PES'TILENCE: malignant and widely destructive disease. The terms Plague and Pestilence, corresponding to the Gr. *Loimos* and the L. *Pestis*, were in former times, used indiscriminately to denote any epidemic diseases affecting large masses of a community, and were remarkable for fatality, e.g., the oriental plague, the sweating sickness, cholera, certain virulent forms of fever, etc. 'Thus,' says Dr. Craigie, 'the term *Loimos* was applied by the Greeks to designate a species of epidemic remittent fever; and the plague of Athens described by Thucydides is manifestly an epidemic form of the same disease, which has been at all times in the summer season endemial on the coasts and islands of the Mediterranean and Archipelago. The instances of *Loimos*, so frequently mentioned by Dionysius of Halicarnassus, and of *Pestis*, so often mentioned by Livy and other Roman historians in the early history of Rome, are manifestly the remittent or remittent-continuous

fever, which has been at all times the native product of that district and which acquired, after inundations of the Tiber, or a certain train of weather, the characters of a very generally diffused, a very malignant, and a very mortal distemper. Numerous instances of a similar inaccurate mode of expression occur in designating the remittent fevers of the middle ages and of modern times; and we find, even in the early history of the colonization of the W. Indian Islands and the United States, frequent examples of the term plague being applied to the remittent fever of these regions, and especially to epidemic attacks of yellow fever.' During the middle ages, the term *Pestis* was applied to numerous disorders, such as syphilis, small-pox, erysipelas, epidemic sore throat, petechial fever, the sweating sickness, gangrenous pneumonia, ergotism, etc. See BLACK DEATH; PLAGUE.

PESTLE, n. *pĕs'l* or *pĕs'tl* [OF. *pestel;* L. *pistil'lum,* the pestle of a mortar—from *pinso,* I grind; Gr. *ptissō:* It. *pestello*]: that with which anything is pounded in a mortar: V. to pulverize; to pound and work up in a mortar. PES'TILLA'TION, n. *-ā'shŭn,* the act of pounding in a mortar.

PES'TO. See PÆSTUM.

PET, n. *pĕt* [Sw. *pytt;* Dan. *pyt;* Norw. *pet,* pshaw! tut! exclamations of displeasure: Magyar, *pittyni,* to blurt with the mouth: Gael, *peat,* a tame animal]: a fit of slight passion or sulks; a fit of peevishness; any animal fondled or indulged; a word of endearment applied to young children [in this sense probably connected with F. *petit,* a little one]: V. to indulge in pets or fits of ill-humor, as a child; to fondle or indulge. PET'TING, imp. PET'TED, pp.: ADJ. spoiled by indulgence; indulged in fits of ill-humor. PETTISH, a. *pĕttĭsh,* pertaining to a pet; fretful; peevish; capricious. PET'TISHLY, ad. *-lĭ.* PET'TISHNESS, n. *-nĕs,* petulance; peevishness. IN A PET, in the sulks. A PET CHILD, an indulged child. TO TAKE THE PET, to be ill-satisfied with; to act like a spoiled child; to sulk. PET COCK, a small plug cock inserted in the end of a steam cylinder through which the water of condensation is allowed to escape when the engine is started. But for this provision, the presence of water, an incompressible medium, in the cylinder, would lead to the possibility of the blowing out of the cylinder ends. *Note.*—That '*pet,* ill-humor,' and '*pet,* a fondling,' have a common origin, will not appear inconsistent, when it is considered that 'to *pet* a child' is 'to indulge it in its *pets* or fits of ill-humor.' There is an obvious connection with F. *petit,* a little one, but the meanings cannot now be separated.

PET, n. *pĕt* [F. *petit,* a little one (see PET 1)]: a fondling; a dear little one; a tame and fondled animal.

PETAL, n. *pĕt'al* [F. *pétale*—from Gr. *pét'alon*, a leaf —from *petannumi*, I spread out: It. *petalo*]: in *bot.*, the leaf of an expanded flower; one of the separate parts of a corolla or flower (see COROLLA). PET'ALED, or PET'-ALED, a. *-ăld*, or PETAL-SHAPED, a. having the shape of a petal. PETALIFORM, a. *pĕ-tăl'ĭ-fawrm* [L. *forma*, a shape]: having the form of a petal. PET'ALINE, a. *-ĭn*, pertaining to a petal. PET'ALOUS, a. *-ŭs*, resembling a petal. PET'ALISM, n. *-ĭzm*, in *anc. Syracuse*, a form of banishment by writing the name of the person to be banished on a leaf. PET'ALITE, n. *-ĭt* [Gr. *lithos*, a stone]: a mineral, consisting mainly of silicates of alumina and lithia, of a white, grayish, or greenish color, and of a lamellar structure in one direction. PETALODY, n. *pĕt-ăl'ŏ-dĭ* [Gr. *eidos*, resemblance]: a state in which sepals become colored like petals; the conversion of stamens or other organs into petals. PETALOID, a. *pĕt'ăl-oyd* [Gr. *eidos*, resemblance]: having the appearance or color of a petal; shaped like the petal of a flower.

PET'ALESHA'RO: Pawnee chief of the Skidi band. He made himself famous by rescuing from sacrifice a young girl captive from the Sioux tribe with which the Pawnees were at war. As she was being led to the place of sacrifice Petalesharo seized her, flung her upon a horse and springing upon another eluded pursuit and carried her near enough to her own people for her to be safe from pursuit. He then daringly returned to his tribe and faced their anger with such intrepidity that his conduct went unpunished. Later he succeeded in abolishing the practice of human sacrifice and upon his visit to Washington in 1821, acting as a delegate from the Pawnees, he was the recipient of much attention, and was presented with a medal in recognition of his service to humanity.

PETALUMA, *pĕt-a-lô'ma:* city in Sonoma co., Cal., on the Northern Pacific railroad, and on Petaluma creek; 42 m. n. by w. from San Francisco, with which it has steamboat connection. There are several churches and schools; several newspapers; and four banks. There are carriage-shops, flour-mills, and manufactures of woolen and other goods. The surrounding agricultural region is very fertile, and much fruit is produced. Grapes are largely cultivated, and wine is made in considerable quantities. Pop. (1900) 3,871.

PETARD, n. *pĕtârd'* [F. *pétard*, a petard—from *péter*, to break wind, to crack—from *pet*, an explosion: comp. L. *pedĭtum*, a breaking wind: It. and Sp. *petardo*]: short piece of ordnance of bell-shape, formerly used for bursting open gates, destroying bridges, etc., by explosion—now supplanted by the more effective gunpowder or dynamite. It consisted of a half-cone of thick iron filled with powder and ball; this is firmly fastened to a plank, and the latter is provided with hooks, to allow of its

being attached securely to a gate, etc. The engineers attached the petard, lighted the slow-match by which it was to be fired, and fled. When the explosion took effect, a supporting column charged through the breach, while the defenders were yet in consternation. Large petards contained as much as 13 lbs. of powder. PETARDEER, or PETARDIER, n. *pĕt'ȧr-dēr'*, one who had the charge of a petard.

PETASUS, n. *pĕt'ă-sŭs* [L. *petăsus;* Gr. *petăsos*, a travelling hat or cap—from *petannumi*, I spread out]: the winged cap of Mercury: common felt hat—adopted from Greece by the Romans; worn by horsemen and ephebi; in shape resembling an umbellated flower reversed, having a low crown and broad brim; in *arch.*, a cupola having the form of a broad-brimmed hat.

PETAVIUS, *pe-tā vĭ-ŭs*, DIONYSUS or DENYS PÉTAU, *pā'tō:* French theologian: b. Orleans, France, 1583, Aug. 21; d. Paris, France, 1652, Dec. 11. He was educated at Orleans and at Paris, pursuing with avidity the studies of mathematics and belles-lettres, and in Paris became an intimate friend of Isaac Casaubon. In 1602 he was appointed to the chair of philosophy at the University of Bourges, which he resigned in 1605 to enter the order of the Jesuits. Subsequently he studied theology at the College of Pont-ă-Mousson, and in 1621 accepted the position of professor of theology at the University of Paris, which he occupied 22 years. After 1646 he devoted himself entirely to literature, completing 49 books dealing with philology, history and theology, which give him rank as one of the greatest scholars of the Jesuit order. His chief work, *Opus de Theologicis Dogmatibus* (5 vols., 1644–50), was uncompleted at his death. He published annotated editions of *Synesius* (1611); *Themisticus* (1613); *Nicephorus* (1616); *Epiphanius* (1622); etc., besides his historical and theological works, among which are: *Opus de Doctrina Temporum* (1627); *Uranologion* (1630); *Rationarium* (1632).

PETCHARY, *pĕch'a-rĭ:* popular name of a number of species of the genus *Tyrannus*, sometimes ranked with the Shrikes (*Laniadœ*), sometimes with the Fly-catchers (*Muscicapidœ*). The name seems derived from the cry of the GRAY Petchary. (*T. Dominicensis*), a bird very common in the warm parts of America and in some islands of the W. Indies, gregarious and migratory, spending the spring and summer in the islands, and retiring to the hottest parts of the mainland from the end of Sep. to the beginning of Jan. Its cry is a kind of shriek, consisting of three or four shrill notes, incessantly repeated. The entire length of the GRAY PETCHARY is about 9½ inches. The COMMON PETCHARY (*T. caudifasciatus*) is one of the most common birds of the W. Indies.

PETCHORA, *pĕt-chō′râ:* large river in n. European Russia, rising on the w. slope of the Ural Mountains, flowing n. through the e. parts of the govts. of Vologda and Archangel, to about 66° 25′ n., then s.e. about 150 m., and finally sweeping toward the n., and expanding into an estuary 30 m. wide and full of islands, passing into the Arctic Ocean, after a course of 940 m. It is said to be navigable for large river-boats more than 700 m. The estuary, open from the middle of June till the middle of Sep., has a depth of 20 to 30 ft. The country through which this river flows is quite uncultivated; dense forests extend on both sides, and the character of the scenery is wild and sombre. The forests abound in larch-wood, now largely used in the construction of iron-clad vessels. Within recent years, a colony has settled at the mouth of the P., for the purpose of felling, dressing, and exporting timber. See Seebohm's *Siberia in Europe* (1881).

PETECHIÆ, n. plu. *pĕ-tĕk′ĭ-ē* [It. *petecchiale*]: spots of dusky crimson or purple color, quite flat, with a well-defined margin, and unaffected by pressure; in appearance closely resembling flea-bites. These spots result from a minute extravasation of blood beneath the cuticle. They occur most frequently on the back, at the bend of the elbow, and in the groin. They indicate an altered state of the blood, and are often symptoms of very serious diseases, e.g., typhus fever, plague, scurvy, etc. They occur likewise in very severe cases of small-pox, measles, and scarlet fever, when their presence is indicative of extreme danger. PETECHIAL, a. *pĕ-tĕk′ĭ-ăl*, spotted; characterized by the appearance of petechiæ.

PETER (Don PEDRO) THE CRUEL, King of Castile and Leon: 1333, Aug. 30—1369, Mar. 23 (reigned 1350–69); b. Burgos; son of Alfonso XI. and Maria of Portugal. On his father's death, P. succeeded to the throne without opposition, but left the whole exercise of power to his mother, Donna Maria, and Albuquerque, his father's prime minister and chancellor. But by the instigation of his mistress (afterward his queen), Marie de Padilla, P. emancipated himself 1353 from the guidance of the queen-mother and her coadjutor Albuquerque, taking the reins of government into his own hands. His rule, being much more impartial than that of the regency, obtained exceeding popularity, which was increased by his affable manner toward the mass of his subjects; but the strict justice with which he decided all causes between the rich and poor, the clergy and the laity, combined with a haughty and imperious carriage toward them, alienated from him the nobles and clergy. The plottings of Albuquerque, who had fled to Portugal, having culminated 1354 in an outbreak in the province of Estremadura, P. marched against the rebels, but was betrayed by his brother, Henry of Trastamare, and taken prisoner 1354, Dec. Popular opinion then declared loudly in his favor; and having escaped from prison, he found himself speedily at the head of a pow-

erful army, with which, despite the excommunication of the pope, he speedily reduced his opponents to submission. But this episode in his career had a disastrous influence on his character for the rest of his life. Betrayed by his relatives, and even by his mother, he became suspicious of every one; and having experienced to the full the power of his enemies, he scrupled not as to the weapons to be employed against them. The rest of his reign was devoted to the destruction of the power of the great vassals, the establishment of his own authority on the ruins of their feudal tyranny, and long-continued and bloody wars with the kingdoms of Aragon and Granada. Henry, who had fled to France, seizing a favorable opportunity, returned 1366 at the head of a body of exiles, backed by Bertrand du Guesclin (q.v.) with an army of mercenaries, and aided by Aragon, France, and the pope. P., however, by promising to England the seaboard of Biscay, with the provinces of Guipuzcoa and Logroño, and supplying a contribution of 56,000 florins, prevailed on Edward the Black Prince to espouse his cause. Edward invaded Castile in the spring of 1367, totally defeated Henry and Du Guesclin at Navarette (April), taking the latter prisoner (releasing him almost immediately), and speedily restoring P. to the throne. But the king disgusted his chivalrous ally by his cruelty to the vanquished, and Edward repassed the Pyrenees, and left the monarch to his fate. Rebellions broke out everywhere; and 1367, in autumn, Henry returned. P.'s scanty and ill-disciplined forces were routed at Montiel, 1369, Mar. 14, he was treacherously decoyed and captured by Du Guesclin and was killed by some of Henry's followers.

PETER I., KING OF SERVIA (PETER KARAGEORGEVITCH), was b. about 1846; son of Prince Alexander Karageorgevitch, grandson of Kara George, Servia's deliverer, and cousin of King Alexander I. At the age of 12 he went into exile with his family. He was educated in France, graduated at the military staff college, and served in the Franco-Prussian war as an officer of the foreign legion, being decorated for gallantry. In 1883 he married Princess Zorka of Montenegro, who died in 1890. In 1903, June 10, a military revolution broke out in Belgrade. King Alexander was assassinated and Prince Peter was proclaimed King. He was crowned June 25.

PETER I., ALEXEIVICH, Czar of Russia, generally denominated PETER THE GREAT: 1672, June 11—1725, Jan. 28 (reigned 1682–1725; in full power 1689–1725); b. Moscow; son of Czar Alexei Mikailovich by his second wife, Natalia Naryskine. His father, Alexei, died 1676, leaving the throne to his eldest son, Feodor, P.'s half-brother. This prince, however, died 1682 without issue, after naming P. as his successor, to the exclusion of his own full-brother, Ivan. This exclusion immediately provoked an insurrection, fomented by the children of the czar Alexei's first marriage, most prominent among whom was the grand-duchess Sophia, a woman of great ability and energy, but of unbounded ambition. Disdaining the seclusion customary among the women of the royal family, she showed herself to the *Strelitz* (q.v.), excited them to fury by an ingenious story of the assassination of her brother Ivan, and then let them loose on the supporters of P.'s claims. After a carnage of three days, during which more than 60 members of the most noble families of Russia were massacred, she succeeded in obtaining the coronation, 1682, July, of Ivan and P. as joint rulers, and her own appointment as regent. Until P.'s coronation, his education had been greatly neglected, but after this time he became acquainted with Lieut. Franz Timmermann, native of Strasbourg, who gave him lessons in the military art and in mathematics; after which he had the good fortune to fall under the guidance of Lefort (q.v.), a Genoese, who initiated him into the sciences and arts of civilization; and by showing him how much Muscovy was in t.ese respects behind the rest of Europe, influenced his whole future career. Lefort also formed a small military company out of the young men of noble family who attended P.; and caused P. himself to pass, by regular steps, from the lowest (that of drummer) to the highest grade in it, rendering him all the while amenable to strict discipline. This course of training, doubtless, saved P. from becoming the mere savage despot which his brutal and passionate disposition, and indomitable energy, inclined him to be; it also protected him from the jealousy of his half-sister, the regent Sophia, who, seeing him absorbed in military exercises and other studies, imagined that he had wholly given himself up to amusement. She, however, soon discovered her mistake; for P., contrary to her wishes, but by his mother's advice, married, 1689, Feb., Eudoxia Feodorowna, of the family of Lapoukin; and in Oct. of the same year demanded of his sister to resign the government. In the ensuing contest, P. was at first worsted, and compelled to flee for his life; but he was speedily joined by the foreigners in the Russian service, with a Scotchman named Patrick Gordon (q.v.) and the Swiss Lefort at their head; and the Strelitz, who had been his antagonist's mainstay, flocking to his standard, she resigned the contest, and was shut up in a convent, whence till her death, 1704, she did not cease to annoy him by her

intrigues. 1689, Oct. 11, P. made his public entry into Moscow, where he was met by Ivan, to whom he gave the nominal supremacy and precedence, reserving the sole exercise of power for himself. Ivan held his puppet sovereignty only till 1696. Though P. was all his life under the dominion of ungovernable passions and sensual habits, yet during great part of his reign he was so exclusively engaged in projecting and carrying out his schemes for the regeneration of Russia, that his gross animal nature had little opportunity of displaying itself.

His first care, on assuming the government, was to form an army disciplined according to European tactics, in which labor he was greatly aided by the valuable instructions of Gordon and Lefort, both of whom were military men, and had served in some of the best-disciplined armies of western Europe. He also labored to create a navy, both armed and mercantile; but at this period Russia presented few facilities for such an attempt, for she was shut out from the Baltic by Sweden and Poland—the former possessing Finland, St. Petersburg (then called Ingria), and the Baltic provinces; and from the Black Sea by Turkey, which, extending along the whole of the n. coast, had reduced that sea to the rank of an inland lake; leaving only the White Sea and the Arctic Ocean, with the solitary port of Archangel, available for the Russian navy. P., thinking the possession of a portion of the Black Sea would best supply the required facilities of accessible seaboard and port, declared war against Turkey, and took (1696) the city of Azov, at the mouth of the Don, after a long siege, which the ineffective condition of his newly disciplined army compelled him to convert into a blockade. Skilled engineers, architects, and artillerymen were then invited from Austria, Venice, Prussia, and Holland; ships were constructed; the army was further improved both in arms and discipline; and many of the young nobility ordered to travel in foreign countries, chiefly in Holland and Italy, for acquiring such information as might be useful in the modernization and civilization of their country. They were ordered to take special notice of all matters in connection with ship-building and naval equipments. Others were sent to Germany to study the military art. Not quite satisfied with this arrangement, P. was eager to see for himself the countries for which civilization had done so much, and which had so highly developed the military art, science, trade, and industrial pursuits; so after repressing a revolt of the Strelitz, 1697, Feb., and dispersing them among the various provinces, he intrusted the reins of govt. to Prince Romonadofski, assisted by a council of three, and left Russia 1697, Apr., in the train of an embassy of which Lefort was the head. In the guise of an inferior official of the embassy, he visited the three Baltic Provinces, Prussia, and Hanover, reaching Amsterdam, where, and subsequently at Saardam, he worked for some time as a com-

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mon shipwright. His curiosity was excessive; he demanded explanations of everything which he did not understand; and to his practice of ship-building and kindred trades, he added the study of astronomy, natural philosophy, geography, and even anatomy and surgery. On receipt of an invitation from William III., King of England, he visited that country, and for three months, partly in London and partly at Deptford, labored to amass all sorts of useful information. While in England he received the honorary degree D.C.L. from the Univ. of Oxford. He left England 1698, Apr., carrying with him English engineers, artificers, surgeons, artisans, artillerymen, etc., to the number of 500; and next visited Vienna, to inspect the emperor of Austria's army, then the best in Europe. He was about to visit Venice also, when the news of a formidable rebellion of the Strelitz recalled him to Russia, which he reached by way of Poland, arriving at Moscow 1698, Sep. 4. Gen. Gordon had already crushed the revolt; but these turbulent soldiers had so enraged P. by their frequent outbreaks, that he ordered them all to be executed, even occasionally assisting in person on the scaffold. A few, however, were pardoned, and sent to settle at Astrakhan. The Czarina Eudoxia, who was suspected of complicity in the conspiracy, which had been the work of the old Russian or anti-reform party, was divorced, and shut up in a convent; the czar's own sister, Martha, was likewise compelled to take the veil. To show his gratitude to his faithful adherents, P. conferred on the chief of them the order of St. Andrew, then instituted. He put the press on a proper footing, caused translations of the most celebrated works of foreign authors to be made and published, and established naval and other schools. At this period, the ordinary arithmetic was first introduced for the management of accounts, these having been previously kept by means of balls strung on a wire (the Tartar method). P. also introduced the mode of raising revenue by taxation of commodities in common use. Trade with foreign countries, formerly punished as a capital crime, was now permitted, or rather, in the case of the principal merchants, insisted upon. Many improvements in dress, manners, and etiquette were introduced authoritatively among the public functionaries, and recommended to the people at large. Even the organization of the national church could not escape P.'s reforming zeal.

In 1700, P., desirous of gaining possession of Carelia and Ingria, provinces of Sweden, which had formerly belonged to Russia, entered into an alliance with the kings of Poland and Denmark to make a combined attack on Sweden, taking advantage of the tender age of its monarch, Charles XII.; but he was shamefully defeated at Narva, his raw troops being wholly unable to cope with the Swedish veterans. P. was not in the least disheartened, for, taking advantage of the Swedes being employed elsewhere, he quietly appropriated a portion

of Ingria, in which he laid the foundation of the new capital, St. Petersburg, 1703, May 27. Great inducements were held out to those who would reside in it, and in a few years it became the Russian commercial depot for the Baltic. In the long contest with Sweden, the Russians were almost always defeated; but P. rather rejoiced at this, as he saw that these reverses were administering to his troops a more lasting and effective discipline than he could have hoped to give them in any other way. He had his revenge at last, in totally routing the Swedish king at Poltava (q.v.), 1709, July 8, and in seizing the whole of the Baltic Provinces and a portion of Finland in the following year. His success against Sweden helped much to consolidate his empire, and to render his subjects more favorably disposed toward the new order of things. After reorganizing his army, he prepared for strife with the Turks, who, at the instigation of Charles XII. (then residing at Bender), had declared war against him: see OTTOMAN EMPIRE. In this contest, P. was reduced to such straits that he despaired of escape, and, looking forward to death or captivity, wrote a letter to his chief nobles, cautioning them against obeying any orders that he might give them while a captive, and advising them regarding a successor to the throne in case of his death. But the finesse and ability of his mistress, Catharine, afterward his wife and successor (see CATHARINE I.), extricated him from his difficulties; and a treaty was concluded 1711, July 23, by which P. lost only his previous conquest —the port of Azov and the territory belonging to it. Shut out from the Black Sea, the possession of a good seaboard on the Baltic became more necessary to him, and the war against Sweden in Pomerania was accordingly pushed with utmost vigor. 1712, Mar. 2, his marriage with his mistress, Catharine, was celebrated at St. Petersburg; and two months afterward, the offices of the central govt. were transferred to the new capital. His arms in Pomerania and Finland met with success, and 1713 the latter province was completely subdued. P. neglected nothing to develop the naval power of the empire, and the strictness with which he enforced the discharge of their duties on his ministers and officers appears from the refusal, by the court of admiralty, of the czar's own application for the grade of vice-admiral, until by defeating the Swedish fleet at Hangoend, and taking the Aland Isles and several coast-forts in Finland, he had merited the honor. In the end of 1716 and beginning of 1717, in company with the czarina, he made another tour of Europe, this time visiting Paris, where he was received with great honors, and returned to Russia 1717, Oct., carrying with him books, paintings, statues, etc., to a large amount. It was soon after this that he ordered his son Alexei (q.v.) to be put to death, and many of the nobles who had been implicated in Alexei's treasonable plans were punished with savage barbarity. In 1721 peace was made with Sweden, and on condition of

that power giving up the Baltic Provinces, Ingria (now govt. of St. Petersburg), Viborg, and Kexholm, and a small portion of Finland, with all the islands along the coast from Courland to Viborg, Sweden received back the rest of Finland, with a sum of about $2,000,000. In 1722 P. began a war with Persia, to open the Caspian Sea to Russian commerce (see PERSIA). The internal troubles of Persia compelled the shah to yield to the demands of his formidable opponent, and to transfer to him the three Caspian provinces, with the towns of Derbend and Baku. On P.'s return to his capital, he inquired into the conduct of his finance ministers, and punished with fines, imprisonment, and even death, those whom he detected in fraudulent acts. To save the empire which he had established and constituted from being abandoned to the weak government of a minor, he, 1722, Feb., promulgated his celebrated law of succession (see PETER II). For the last years of his life he was engaged chiefly in beautifying and improving his new capital, and carrying out plans for more general diffusion of knowledge and education among his subjects. In the autumn of 1724 he was seized with serious illness, the result of his imprudence and later habitual excesses; and after great suffering, he died. See the Life by E. Schuyler.

PETER II., ALEXEIVICH, Czar of Russia: 1715, Oct. 23—1730, Jan. 29 (reigned 1727–30); b. St. Petersburg; sole male representative of Peter the Great, being son of the unfortunate Alexei (see PETER I.) by his wife, Princess Charlotte of Brunswick-Wolfenbüttel. On the death of the Czarina Catharine I., P. ascended the throne, 1727, May 17, in accordance with a decree of Peter the Great, which enjoined that each czar should name his successor; and the ambitious Menshikoff, who hoped to govern more easily in the name of a minor, prompted the empress to choose P. In order to secure himself in his high position, Menshikoff affianced one of his daughters to the youthful czar, and compelled his relative, Anna Petrowna and her husband, Duke of Holstein, to retire to their own estates. But, notwithstanding these and other precautions, his power was overturned by a mere child, a playfellow of the boy-ruler, who was of the powerful family of Dolgorouki. Instigated by his friends, this boy, Ivan Dolgorouki, opened the eyes of his sovereign to the humiliating dependence in which he was held by Menshikoff, and inspired him with a strong desire to free himself. The plan succeeded, and the minister and his family were exiled to Siberia, the Dolgorouki family taking their place as favorites. The marriage of a lady of this family with P. had been arranged, and was almost on the point of being celebrated, when the czar was seized with small-pox, and died at St. Petersburg. During his short reign, the three Caspian provinces, Asterabad, Ghilan, and Mazanderan, which had been seized by Peter the Great, were recovered by Persia.

PETER III., FEODOROVICH, Czar of Russia: 1728, Mar. 4—1762, July 14 (reigned 1762, June 5—July 10); grand-

son of Peter the Great (being son of his eldest daughter Anna Petrowna, wife of Karl Friedrich, Duke of Holstein-Gottorp); b. Kiel. He was declared 1742, Nov. 18, by Czarina Elizabeth (q.v.), her successor on the throne of Russia. From the time of his being publicly proclaimed heir, he lived at the Russian court; and, in obedience to the wishes of the czarina, married Sophia Augusta, a princess of Anhalt-Zerbst, who, on entering the Greek Church (a necessary condition of marriage of a foreigner with the czar present or presumptive), assumed the name Catharina Alexiowna. P. succeeded Elizabeth on her death 1762, June 5; and his first act of authority was to withdraw from the confederate league of France, Austria, and Russia against Prussia, restoring to Frederick II., the heroic monarch of Prussia, the provinces of Prussia proper, which had been conquered during the Seven Years' War, and sending to his aid a force of 15,000 men; a line of conduct which seems to have been prompted solely by his admiration for the Prussian sovereign. He also recalled many of the political exiles from Siberia, among whom were L'Estocq, Münnich, and the Duke of Courland; abolished the sanguinary law which proscribed any one who should utter a word against the Greek Church, the czar, or the government; and then attempted the realization of his favorite project, which was to recover from Denmark that portion of Slesvig which had been ceded to her 1713, and to avenge the tyranny and annoyances to which his family—that of Holstein-Gottorp—had been subjected. But before the army he had dispatched could reach its destination, a formidable conspiracy, headed by his wife, and supported by the principal nobles, had broken out against him. This conspiracy originated in the general discontent at the czar's conduct and government; for the nobility were offended at his liberal innovations, and the preference that he showed for Germans; the people and clergy, at his indifference to the national religion, and his ill-concealed contempt for Russian manners and customs; while the whole nation murmured at his servility to Frederick II. of Prussia. His wife had still deeper cause for dislike; for though he was himself addicted to drunkenness and debauchery, he never ceased to reproach her with her infidelities; and had even planned to divorce her, disinherit her son Paul (q.v.), and elevate his mistress Elizabeth Woronzof to the conjugal throne. The revolution broke out 1762, on the night of July 8; P. was declared to have forfeited his crown, and his wife Catharine was proclaimed czarina as Catharine II. (q.v.) by the guards, the clergy, and the nobility. P., who was then at Oranienbaum, neglecting the counsels of Field-marshal Münnich, who proposed to march at once on the capital at the head of the regiments which were still faithful, or at least to take secure possession of Cronstadt and the fleet, soon found even the opportunity of flight cut off, and was compelled to submit. He abdicated July 10, and on the 14th was put to death by Orloff (q.v.), to secure the safety of the conspirators.

PETER, or CEPHAS, *sē'fas*, named originally SIMON, Apostle of Jesus Christ: native of Bethsaida, on the Lake of Gennesaret. His father was called Jonas; and the name by which P. is known in Christian history was given to him by the Lord Jesus, who changed his name of origin (Bar-Jona) into *Cephas*, a Syro-Chaldaic word, which means 'rock' or stone, and for which *Petra*, or, in the masculine form, *Petros*, is the Greek equivalent. He was a fisherman by occupation, and, together with his brother Andrew, was actually engaged in this occupation on the Sea of Galilee when Christ called both to be his disciples, promising to make them 'fishers of men.' For this invitation they had been prepared by the preaching of John the Baptist, and they accepted it without hesitation. For the incidents recorded of P.'s life as a disciple, see the gospel narrative. These incidents all evince chiefly a warm and impulsive character, even down to the hour of weakness in which he denied his Master. It is plain from the gospel narrative that he was regarded by the Lord Jesus with special affection; and the events which followed Christ's ascension accord with this inference from that narrative. He was the first mover of the election of a new apostle to fill the vacancy left by Judas Iscariot; he was spokesman for the others on the day of Pentecost; he it was who answered to the charges when they were brought before the council; he was chief actor in the tragic scene of the death of Ananias and Sapphira; he was the first to break down the wall of the prejudice of race by receiving a Gentile convert into the church; he was the first to propound in the Council of Jerusalem the question to be discussed as to the obligation of the Mosaic observances. The last incident of P.'s life supplied by the Scripture narrative is his presence in the Council of Jerusalem, A.D. 49. Of his subsequent career, our only knowledge is derived from tradition. His special mission was to the Hebrew race, as Paul's was to the Gentile; and he is supposed to have preached through Pontus, Galatia, Cappadocia, Asia, and Bithynia, chiefly to those of his own nation dispersed in these countries, all which are named in the address of the first of the two Epistles which he has left (see PETER, THE EPISTLES GENERAL OF). Another tradition which, until the 16th c., met general acceptance, reports that he preached at Rome, that he took up his residence there as bishop, and that there he suffered martyrdom. This tradition is a foundation of the Roman claim to supremacy in the church. It early encountered the opposition of the reformers; its first antagonist being a writer named Velerius, whose work was published 1520, and who was followed by Flacius, Salmasius, and, above all, Spanheim. This opposing view has found supporters in Baur and the Tübingen school; but the main current of scholarship, Prot. as well as Rom. Cath.—from Scaliger, Casaubon, Usher, Pearson, Cave, etc., to Neander, Gieseler, Bertholdt, Olshausen in Germany, and others in Britain—has ac-

cepted the Roman tradition. Recently among Prot. scholars in England and the United States, the assent is less ready; and it is claimed that the evidence adduced for this tradition is not of a nature and amount adequate to make it the basis of important doctrines of the Christian faith. The evidence on both sides seems nearly evenly balanced. The time of P.'s going to Rome also has been the subject of much discussion. By some, he is alleged not to have gone to Rome till the year 63, or, at all events, a short time before his martyrdom; others date his first visit as early as 42 or 43, without, however, supposing his residence after this date to have been continuous. In his first Epistle, it is implied that at the time of writing it he was at Babylon; and the name Babylon is by many critics held to be employed as a mystic designation of Rome, in accordance with a practice not unusual with the Hebrews and other orientals; but there is nothing to fix conclusively the date of this Epistle. He is held by Rom. Cath. writers to have fixed his see at Antioch before proceeding to Rome; but of this supposed event, also, the date is uncertain. His martyrdom is fixed, with much probability, in 66, and is supposed to have been at the same time and place with that of the apostle Paul. P. was sentenced to be crucified, and, according to the tradition (preserved by Eusebius from Origen), asked that he might be crucified with his head downward, in order that his death might exceed in ignominy that of his Divine Master.

PETER, The Epistles General of: two Epistles in the canon of the New Test.; called *general*, because they are addressed not to particular churches or persons, like those of the apostle Paul; but (as in the case of the 1st Epistle) to all the Christians scattered throughout Asia Minor, or (as in the case of the 2d) to the entire body of Christians without exception. The objects of the *First Epistle* are to strengthen believers under trials; to exhort them to the earnest performance of all duties—personal, social, and domestic; and to demonstrate how thoroughly that performance depends on a spiritual recognition of Christ and his work. There is a strong eschatological tendency in the Epistle; the apostle seems to grow more intensely serious, under the conviction that 'the end of all things is at hand' (iv. 7). That the Epistle is the composition of Peter is very generally admitted. The external evidence is singularly strong; while the internal, derived from a consideration of style, sentiment, and doctrine, is equally so. We see in every sentence the ardent, impassioned, practical, unspeculative character of Peter, who held with a fine Hebraic vehemence of faith the great facts and principles of Christianity, but could not, like the more subtle and logical Paul, give them a systematic representation. Many critics have warmly praised the beauty and strength of the language.—The *Second Epistle*, whose correspondence to the Epistle of Jude is very noticeable, stands in a very different position from the first. So far as external

authority is concerned, it has scarcely any. The most critical and competent of the Fathers were suspicious of its authenticity; it was rarely, if ever, quoted, and was not formally admitted into the canon till the Council of Hippo, 393. The internal evidence is not regarded as abundant. The great difference of style between it and the first Epistle is universally admitted. Bunsen, Ullmann, and Lange hold indeed that chap. ii. is an interpolation, but consider i. and iii. genuine. Many critics regard the Epistle as a fabrication, and judge that its contents show it to have been meant as a Christian attack on the Gnosticism of the 2d c. [See the remarks on II Peter in Neander's *Geschichte der Pflanzung und Leitung der Kirche durch die Apostel.*] The principal arguments adduced for its apostolic character are—1, that its rejection would endanger the authority of the canon; 2, that it is inexplicable how the church should have received it if it had not regarded Peter as the author.

PETER THE HERMIT: first mover of the great mediæval CRUSADES (q.v.): about 1050–1115, July 7; b. Amiens, France, of good family. Having been educated at Paris and in Italy, he became a soldier, served in Flanders without much distinction, retired from the army, married, and had several children. On the death of his wife, he became a monk, and ultimately a hermit. In a pilgrimage to the Holy Land about 1093, he was moved by seeing the Holy Sepulchre in the hands of the Infidel, and by the oppressed condition of the Christian residents or pilgrims; and on his return spoke so earnestly to Pope Urban II., that that pontiff adopted his views, and commissioned him to preach throughout the West an armed confederation of Christians for the deliverance of the Holy City. (Hagenmeyer in his monograph *Peter der Eremita*, 1880, denies that P. was ever in Palestine till he went with the crusaders, and asserts that the scheme of a crusade originated with the pope, not with the hermit.) Though P. was mean in figure, his enthusiasm lent him power. From province to province, from city to city, he wandered. 'He rode,' writes Milman, 'on a mule, with a crucifix in his hand, his head and feet bare; his dress was a long robe, girt with a cord, and a hermit's cloak of the coarsest stuff. He preached in the pulpits, on the roads, in the marketplaces. His eloquence was that which stirs the heart of the people, for it came from his own—brief, figurative, full of bold apostrophes; it was mingled with his own tears, with his own groans; he beat his breast: the contagion spread throughout his audience. His preaching appealed to every passion—to valor and shame, to indignation and pity, to the pride of the warrior, to the compassion of the man, to the religion of the Christian, to the love of the brethren, to the hatred of the unbeliever aggravated by his insulting tyranny, to reverence for the Redeemer and the saints, to the desire of expiating sin, to the hope of eternal life.' The results are well known, as among those marvels of moral enthusiasm of which

history presents occasional examples. All France, especially, was stirred from its depths; and just at the time when the enthusiasm of that country had been already kindled to its full fervor, it received sacredness and authority from the decree of a council at Clermont, in which Urban himself was present, and in which his celebrated harangue was the signal for the outpouring, through all western Christendom, of the same chivalrous emotions by which France had been borne away under the rude eloquence of the Hermit. For the details of the expedition, see CRUSADES: our present concern is with P.'s personal history. Of the enormous but undisciplined army which assembled from all parts of Europe, one portion was committed to his conduct; the other being under the command of a far more skilful leader, Walter the Pennyless. P. placed himself at their head, mounted on his ass, with his coarse woolen mantle and his rude sandals. On the march through Hungary, they became involved in hostilities with the Hungarians, and suffered a severe defeat at Semlin, whence they proceeded with much difficulty to Constantinople. There Emperor Alexis, filled with dismay at the want of discipline which they showed, was but too happy to give them supplies for their onward march; and near Nice, they encountered the army of the Sultan Solyman, from whom they suffered a terrible defeat. P. accompanied the subsequent expedition under Godfrey; but worn out by the delays and difficulties of the siege of Antioch, he was about to withdraw from the expedition, and was retained in it only by the influence of the other leaders, who foresaw the worst results from his departure. Accordingly, he had a share, though not marked by any signal distinction, in the siege and capture of the Holy City 1099; and the closing incident of his history as a crusader was an address to the victorious army delivered on the Mount of Olives. He returned to Europe, and founded at Huy a monastery, in which he died.

PETERBOROUGH, *pē'tėr-bŭr-ŭh:* episcopal city and parliamentary borough, chiefly in Northamptonshire, partly in Huntingdonshire, England; on the left bank of the Nene—which is thus far navigable for boats; 37 m. n.e. of Northampton, 76 m. n.n.w. of London by railway. The Great Northern, the Eastern Counties', the Northampton and Peterborough, and the Midland Counties' railways pass the city, and have stations here. P. is regularly laid out, has an excellent grammar school with an endowment, a corn exchange in the Italian style, a jail and house of correction, a handsome parish church, and a number of chapels and meeting-houses, schools, and charitable institutions. The city had its origin in a great Benedictine monastery, founded 655 by Oswy, King of Northumbria, and by Peada, son of Penda, King of Mercia. This monastery, which became one of the wealthiest and most important in England, was reared in honor of St. Peter; but it was not until after being destroyed by the Danes 807, and rebuilt

about 966, that the town was called Peterborough. In 1541 the church—the third that has occupied the site—was made a cathedral. See Poole's *Peterborough* (1881).

The great edifice of P. is this famous cathedral, which holds probably the highest rank among English cathedrals of the second class, and possesses some special points of interest which give it a place scarcely second to any. It is one of the three Norman cathedrals of England. The choir and e. aisles of the transept (built 1118–33) are early Norman; the transept (1155–77) is middle Norman; the nave (1177–93) is late Norman; the w. transept (of the same period) is transition Norman; the w. front, which, as a portico (using that term in its classical sense), is said to be the grandest and finest in Europe, is early English; and the e. aisle (begun 1438, not completed till 1528) is perpendicular. The beautiful and unique western front consists of three arches 81 ft. in height, supported by triangular piers detached from the w. wall. Each arch is surmounted by a beautiful pediment and cross. The front is flanked on each side with turrets 156 ft. high, and crowned with pinnacles. The roof of the nave is painted in lozenge-shaped divisions, containing figures of kings, bishops, grotesques, etc., in colors. A central tower, lantern-shaped, rises at the intersection of the nave and transept. In the north-choir aisle, a slab of blue stone still covers the remains of Catharine of Aragon. On the stone is carved the simple inscription, 'Queen Catharine, A.D. 1536.' In 1587, July, the remains of Mary, Queen of Scots, were brought here from Fotheringay for interment, and here they rested until, 25 years later, they were removed to Westminster Abbey. The entire length of the cathedral is 476 ft. 5 inches; breadth of nave and aisles, 78 ft.; height of the ceiling of the church, 78 ft.; breadth of the church at the great transepts, 203 ft.; height of lantern, 135 ft; length of w. front, 156 ft.; height of central tower from the ground, 150 ft. The great square tower was taken down and rebuilt 1883–85.

P. has active trade in corn, coal, timber, lime, bricks, and stone. Two newspapers are published weekly. As the junction of so many railway lines, its trade and general prosperity have had rapid recent increase. Pop. (1871) 17,434; (1881) 22,394; (1891) 25,172.

PETERBOROUGH, *pē'tėr-bŭr-ŭh:* town, cap. of P. co., Ontario, Canada; on the Canadian Pacific and the Midland division of the Grand Trunk railroad, and the Otonabee river; 67 m. n. from Toronto. The town is well laid out, the streets are lighted with gas, and there is a good water-power. Steamers ascend the river to this point, and transport large quantities of lumber, grain, and flour. There are foundries, saw-mills, and grist-mills, and manufactures of leather, woolen goods, and agricultural implements. There are 3 monthly, 3 weekly, and 3 daily newspapers; and 4 banks. Pop. (1891) 9,717; (1901) 11,239.

PE'TERBOROUGH, Lord: see Mordaunt.

PETER CLAVER, *klâ-vär':* missionary to African slaves: 1582–1654, Sep. 8; b. Catalonia, Spain. When 20 years of age, he became a member of the Soc. of Jesus, and 1610, at his earnest request was assigned to duty among the slaves, which in large numbers were being brought into the country. He was located at Cartagena, at which port the slave-trade then centered; received ordination as a priest, and gave himself with wonderful zeal to imparting religious instruction to the slaves, and improving their physical condition. To facilitate his work, he publicly proclaimed himself 'the slave of the negroes forever.' He spent his life on board the slave-ships and in hospitals, ministering to the bodily and spiritual needs of the blacks, and suffering extreme privations. He was pronounced a hero by Benedict XIV. and beatified by Pius IX. His life has been written in French and in Spanish.

PETERHEAD, *pē-tėr-hĕd:* seaport and municipal and parliamentary burgh, in the dist. of Buchan, Aberdeenshire; on a peninsula, the eastmost point of land in Scotland; 44 m. n.n.e. of Aberdeen by railway. It is irregularly built, clean, and paved largely with the reddish granite, named after the town, and used for polishing. The Earls Marischal, before their attainder 1715, owned much of the parish, and were superiors of the town of Peterhead. The property was bought by the Merchant Maiden Hospital of Edinburgh, the governors of which have greatly improved the town and port. Peterhead has two libraries. There are cloth and wincey manufacturers, and considerable ship-building. The chief exports are herrings, cod-fish, butter, grain, and granite; and imports, lime, wool, and general merchandise. Peterhead was long the chief British depot of seal and whale fishing, but this interest has declined. Peterhead has a harbor on the n., another on the s., side of the isthmus of the peninsula on which it is built, and they are connected by a passage cut across the isthmus, allowing vessels to leave the harbor in different winds. On the s. side of the Bay of Peterhead, and about 2½ m. from the town, are the Buchanness and its light-house, and Boddam Castle ruins. The Ugie enters the sea a mile n.w. of Peterhead; and on its banks, 3 or 4 m. n.w. of the town, are the ruined castles of Inverugie and Ravenscraig. The walls of the former are still standing, and access is obtained to the roof by a winding staircase in one of the towers, giving a magnificent view of the valley of the Ugie. Ravenscraig, on a rock on the opposite side of the river, is considered a good specimen of the ancient Scottish baronial style, in the square form common in the beginning of the 13th c.; its walls are so strong as to have been deemed impregnable previous to the use of artillery.—Pop. of Peterhead (1901) 11,763.

PE'TER-HOUSE. See ST. PETER'S COLLEGE (Cambridge.)

PE'TER LOM'BARD. See LOMBARD, PETER.

PETERLOO MAS'SACRE, *pē-tėr-lô'* [fanciful term suggested by Waterloo]: popular name for the dispersal of a large meeting by armed force in St. Peter's Field, Manchester, England, 1819, Aug. 16. The assemblage, chiefly operatives from different parts of Lancashire, was called to consider parliamentary reform. The dispersal took place by order of the magistrates; several troops of horse, including the Manchester yeomanry, being concerned in the affair. Five or six persons were killed, and many wounded. St. Peter's Field is now covered by buildings. (See *History of the Peace*, by Harriet Martineau, ed. of 1858; p. 107.)

PETERMANN, *pā'tėr-mân*, AUGUST: geographer: 1822, Apr. 18—1878, Sep. 25; b. Bleicherode, Saxony. He was educated at Nordhausen, and at the age of 17 went to the Potsdam Cartographic Institution, where he studied under Dr. Berghause and greatly assisted him in work on his *Physical Atlas*, and drew the maps for Humboldt's *Asie Centrale*. After remaining in Potsdam six years he went to Edinburgh where he rendered distinguished service in bringing out the English ed. of A. K. Johnson's *Physical Atlas*. He was in London 1847–54; became a member of the Royal Geog. Soc., and a noted writer on geographical subjects. In 1854 he returned to Germany as manager of the Geographical Institute at Gotha, and founded a magazine for diffusion of geog. knowledge. He made special studies of African and Arctic exploration, and on these subjects became the leading authority in the world. He was the trusted adviser of most of the explorers of his time, and in some cases raised most of the means for carrying on their enterprises. His maps were remarkably clear and accurate. He died at Gotha.

PETER MARTYR. See VERMIGLĬ, PIETRO MARTIRE.

PETERS, *pē'tėrz*, Ger. *pā'terss*, CHRISTIAN HENRY FREDERICK, PH.D.: 1813, Sep. 19—1890, July 19; b. Coldenbüttel, Schleswig, Germany: astronomer. He graduated at the Univ. of Berlin 1836; continued his studies in Copenhagen; was engaged in surveying Mount Etna 1838–43; served under Garibaldi in the revolution in Italy, and was made maj. of artillery for bravery on the field of battle; had a price set on his head at the close of the revolution; and, after escaping to Turkey, came to the United States 1853. On letters from Humboldt and other European scientists, and from George P. Marsh, U. S. minister to Turkey, he received an appointment in the U. S. coast survey, and was stationed first at the observatory in Cambridge, Mass., and afterward at the Dudley Observatory in Albany, N. Y. In 1858 he was called to Hamilton College, Clinton, N. Y., for observatory work; and 1867, when Edwin C. Litchfield endowed the observatory and chair of astronomy with $30,000, the name of the former was changed to Litchfield Observatory, and

Peters was appointed its director and prof. of astronomy in the college. He had charge of the party that observed the solar eclipse at Des Moines 1869, and was head of the govt. expedition that observed the transit of Venus in New Zealand 1874. Peters discovered 48 asteroids; recorded nearly 14,000 solar spots; proved and registered more than 112,000 zone stars; published 20 *Celestial Charts* 1884, and completed but did not publish a second series of these charts 1888.

PE'TERS (or PE'TER), HUGH: 1599–1660, Oct. 16; b. Fowey, Cornwall, England. He graduated from Trinity College, Cambridge, 1622, took orders, commenced preaching in London as a nonconformist, and thereby incurred the displeasure of Abp. Laud, who sent him to prison. On regaining his liberty, he preached for a number of years to an independent congregation at Rotterdam. With two of his brothers, he came to New England 1635; and the following year succeeded Roger Williams as pastor of the church in Salem, Mass. He became an overseer of Harvard College 1637; and 1638 was requested by the gen. court to aid in a revision of the laws of the colony. With two others, he was sent to England 1641 to obtain a modification of the laws regulating trade between the mother country and the colonies. He joined the army of Cromwell, became a commissioner to revise the laws, held various civil and ecclesiastical positions; but on the restoration of Charles II. was brought to trial and suffered death for high treason. The execution was in the Tower of London. His enemies denounced him as grossly immoral, but his friends maintained that he was a wise and a good man. His writings were peculiar, and attracted considerable attention. Among them were a series of letters with the title of *A Dying Father's Legacy to an Only Child* (1660); *A Word for the Army and Two Words for the Kingdom, to clear the One and cure the Other, Forced in much Plainness and Brevity from their Faithful Servant, Hugh Peters;* and *A Good Work for a Good Magistrate, or a Short Cut to a Great Quiet.*

PETERS, JOHN PUNNETT, PH.D., DD., SC.D.: American Episcopal clergyman and archæologist: b. New York 1852, Dec. 16. He was graduated from Yale in 1873, studied in Berlin and Leipsic 1879–83, entered the ministry, was professor of Old Testament languages and literature in the Episcopal Divinity School, Philadelphia, in 1884; of Hebrew at the University of Pennsylvania in 1885, and was in charge of the expedition of that university which conducted excavations at Nippur, 1888–91. From 1893 to 1904 he was rector of St. Michael's Church, New York, and since 1904 canon residentiary of the Cathedral of St. John the Divine, New York. He has published: *Scriptures, Hebrew and Christian* (1886–9); *The Bible as Literature* (1896); *In Laude Zion* (1896); *Nippur* (1897); *The Old Testament and the New Scholarship* (1901); *The Religion of Israel.*

PETERS, *pā'tĕrs*, KARL: German explorer: b. Neuhaus, Hanover, Germany, 1856, Sept. 27. He was educated in Göttingen, Tübingen, and Berlin, founded the German Colonization Society in 1884, and led an expedition to Central Africa, where he raised the German flag in Usagara, Ukami, Nguru, and Useguha. He was granted the first Imperial Charter in German history, founded German East Africa in 1885; and continued his management of the colonial possessions until 1888, meanwhile annexing more territory in East Africa. In 1889–90 he led the German relief expedition in search of Emin Pasha and in 1890 reached Victoria Nyanza, after crossing which he met Emin Pasha with Stanley. In 1891–3 he was imperial high commissioner for East Africa and succeeded in establishing the boundary line between English and German possessions. He was attached to the colonial office in Berlin in 1893–5 and in 1896 was accused of cruelty in his treatment of the natives of Africa and recalled. The subsequent investigations resulted in his dismissal. In 1899–1901 he explored the region between Zambesi and Sabi. Among his publications are: *New Light on Dark Afriea; Willenswelt und Weltwille* (1883); *Die deutsehe Emin Pasha-Expedition* (1891); *Æquatorial und Südafrika nach einer Darstellung von* 1719 (1895).

PETERS, *pē'tėrz*, MADISON CLINTON, D.D.: American Baptist clergyman: b. Lehigh County, Pa., 1859, Nov. 6. He was educated at Franklin and Marshall College, Lancaster, Pa., and Heidelberg Theological Seminary, Tiffin, Ohio; entered the Reformed (German) ministry in 1880, and was pastor of the Bloomingdale Church, Broadway, New York, for 11 years. He then adopted the Baptist faith and was in charge of the Sumner Avenue Baptist Church, Brooklyn, and the Immanuel Baptist Church, of Baltimore until 1907, since which time he has been preaching in the Majestic Theater, New York. He has published: *Justiee to the Jew* (1899); *Wit and Wisdom of the Talmud* (1900); *Sanctified Spiee* (1895); *Why I Beeame a Baptist* (1901); *Will Our Republic Live?* (1902); *The Jews in America* (1905); *The Love Affairs of Great Poets* (1907); etc.

PE'TERS, RICHARD, LL.D.: 1744, June 22—1828, Aug. 22; b. Philadelphia; son of William P. He graduated from the College of Philadelphia 1761, was admitted to the bar 1763, and was register of the admiralty 1771 till the revolution. He was an ardent patriot, commanded a military company, 1775, was secretary of the continental board of war 1776–81, and on his resignation received a vote of thanks from congress for faithful service. He was a member of the continental congress 1782–3, of the state assembly 1787, speaker of the latter body 1788–90, and of the state senate 1791. He declined the office of comptroller of the U. S. treasury, was judge of the district

court of Penn. 1792–1828, and for more than 30 years was pres. of the Philadelphia Agricultural Soc. He was an eminent lawyer, wrote many papers on agriculture, and published various court reports. He died at Philadelphia.

PETER'S (SAINT) CHURCH, at Rome: see ST. PETER'S CHURCH.

PETER'S (SAINT) COLLEGE, Cambridge: see ST. PETER'S COLLEGE.

PE'TERS, SAMUEL ANDREW, LL.D.: 1735, Dec. 12—1826, Apr. 19; b. Hebron, Conn.; distant relative of Hugh P. He graduated from Yale College 1757, travelled in Europe, took orders in the Church of England, and 1762 was placed over the Episc. Church at Hebron. He strongly antagonized the colonies in their troubles with the mother country, and returned to England 1774. He was elected bishop of Vt., but the abp. refused consecration. Returning to America, he obtained a grant of land near the Falls of St. Anthony, which for many years he vainly endeavored to have confirmed by congress; and settled in New York 1818, where he remained in poverty till his death. His original name was Samuel, the Andrew being added by himself after the death of a brother by that name. He received the degree LL.D. from Columbia College 1761. He wrote several works, of which the most notorious was a *General History of Connecticut*, in which he published the apocryphal 'Blue Laws' of the colony, and vented his spite against the people. The work was characterized by Dr. Dwight as 'a mass of folly and falsehood,' and has no historical value.

PETERSBURG, *pē'tėrz-bėrg:* city and port of entry, in Dinwiddie co., Va., on the Richmond and Petersburg, the Norfolk and Western, and the Petersburg railroads, and on the Appomattox river, 12 m. from its mouth, 23 m. s. from Richmond. There are 25 churches; a collegiate institute, good public schools, and several excellent private schools; two daily and five weekly newspapers, one of the latter being an agricultural publication; two public libraries; a theatre; and a national bank (cap. $100,000), a state bank (cap. $200,000) and a private bank. Among fine public buildings are the court-house, custom-house and post-office, a state lunatic asylum for colored people, and two market-houses. The city is on rising ground, is well drained, has abundant water from a reservoir, and is well lighted with gas. There is a very fine public park known as Poplar Lawn. The manufacturing interests are varied and extensive. There are flour-mills, cotton-mills, iron-foundries, wooden-ware shops, and tobacco factories —about 60 establishments in all, employing a large number of hands. The river is navigable for vessels of considerable size as far as the falls, which are near the city. A large business is done also by flat-boats, used for 100 m. above the falls. The river furnishes an excellent water-power. Remains of the intrenchments for the defense of the city during the civil war, in which it was the last fortified position held by the Confederacy, may still be

seen (see PETERSBURG, SIEGE OF). The city is on ground formerly occupied by an Indian village, which was destroyed by white men 1676. In 1733 it was laid out by Col. William Byrd, and was incorporated 15 years later. At two periods in the revolution the British army had its headquarters here. Articles of incorporation were again secured 1781. The intense patriotism of its volunteers in the war of 1812 secured for P. the name 'Cockade City of the South.' Since the civil war, the city has made rapid progress and has become a very important point of shipment for agricultural products of the surrounding region. Its manufactures also have increased. Pop. (1890) 22,680; (1900) 21,810; (1910) 24,127.

PE'TERSBURG, ST.: see ST. PETERSBURG.

PE'TERSBURG, SIEGE OF: series of military operations which immediately preceded, and which led to, the close of the civil war. The failure of various attempts to reach Richmond by other routes led Gen. Grant, after the battle of Cold Harbor (see COLD HARBOR), to plan an assault on Petersburg, which had been strongly fortified. He accordingly brought his army across the James river to City Point, 1864, June 12; and three days later an unsuccessful attempt was made by a portion of his troops to take the position. The following day a larger force made an assault, but was repulsed by the Confederates. On June 19th the siege commenced in earnest. With the design of cutting off food supplies to the Confederates from the south, several miles of railroad track were destroyed. In July part of the Union forces crossed the James river, and took a position threatening Richmond, in hope of drawing part of the Confederate army from P. and thus facilitating its reduction. An immense mine, which had been formed under one of the Confederate forts, was fired July 30. It destroyed the fort and formed a crater 200 ft. long and 30 ft. deep. A desperate but unsuccessful assault was made, the Union troops being repulsed with losses far exceeding those of the Confederates. The siege was continued during the fall and winter, and various attacks were made, but nothing of importance was gained. Early the following April, bombardment was resumed. This, with the Union victory at Five Forks, led Gen. Lee to prepare for evacuation of the city. Apr. 3, most of the Confederate force was withdrawn; and, after a sharp contest at one of the forts, the Union army took possession of the place. These movements were followed Apr. 9 by the surrender of the Confederate army at Appomattox.

PETERSHAM, n. *pē'tėr-shăm* [after Lord *Petersham*, its introducer]: a very thick, shaggy cloth, usually dark blue, used for heavy overcoats; a thick belt-ribbon by which ladies' skirts or bodices may be retained in their place.

PETER'S PENCE, n. *pē'tėrz pĕns*, or PETER-PENCE, n. [after the apostle *Peter*, whose successor the pope of Rome declares himself to be]: annual tribute from households, collected in several of the western kingdoms of Europe and offered to the Roman pontiff, in reverence of the memory of the apostle Peter, claimed by the Rom. Cath. Chh. as the first in the line of popes at Rome. From an early period, the Roman see had been richly endowed; and though its first endowments were chiefly local, yet, as early as the days of Gregory the Great, large estates were held by the Roman bishops in Campania, in Calabria, and even in the island of Sicily. The first idea, however, of an annual tribute appears to have come from England. It is ascribed by some to Ina (721), King of the West Saxons, who went as a pilgrim to Rome, and there founded a hospice for Anglo-Saxon pilgrims, to be maintained by an annual contribution from England; by others, to Offa and Ethelwulf, at least in the sense of their having extended it to the entire Saxon territory. But this is very uncertain; and though the usage was certainly anterior to the Norman conquest, Dr. Lingard is disposed not to place it higher than the time of Alfred. The tribute consisted in the payment of a silver penny by every family possessing land or cattle of the yearly value of 30 pence; and it was collected on Lammas Day, or during the five weeks between St. Peter's and St. Paul's Day and Aug. 1. In the time of King John, the total annual payment was £199 8s., contributed by the several dioceses, in various proportions (see Lingard's *History of England*, II. 330). The tax, called Romescot, with some variation, continued to be paid till the reign of Henry VIII., by whom it was abolished. By Gregory VII., it was sought to establish it for France; and it appears also in Denmark, Sweden, Norway, and Poland. This tribute differs from the payments of the feudatory kingdoms, such as Naples, Aragon, and England under the reign of John.

The pope having suffered considerable diminution of his own revenue since the revolution of 1848, an effort has been made in several parts of Europe and in America to revive this tribute. In some countries, it has been very successful, and the proceeds have been among the chief resources by which the pope has been so long enabled to meet the pressure of pecuniary embarrassments caused by diminished territorial possessions. Since the total annexation of the Papal States to the kingdom of Italy, the tribute has been largely increased in France, Belgium, England, Ireland, and America.

PETERWARDEIN, *pā′tėr-vâr-dīn:* town in the Austrian province of Croatia and Slavonia, one of the strongest fortresses in the Austrian dominions; in a marshy, unhealthful locality on the right bank of the Danube, 50 m. n.w. of Belgrade. The ordinary garrison is a very strong one. The most ancient part of the fortifications, the Upper Fortress, is on a rock of serpentine rising on three sides abruptly from the plain. P., on a narrow peninsula formed by a loop of the Danube, occupies the site of the Roman Acumincum (*acumen*, point), and is said to have been named in honor of Peter the Hermit, who marshalled here the soldiers of the first crusade. In 1688 the fortifications were blown up by the imperialists, and the town was soon after burned to the ground by the Turks; but at the Peace of Passarowitz, 1718, July 21, it remained in the possession of the emperor. Here 1716, Aug. 5, Prince Eugene obtained a a great victory over the grand vizier Ali.—Pop. town and suburbs (besides the garrison) 5,000, mostly German

PETIGRU, *pĕt′ĭ-grô*, James Louis: 1789, Mar. 10—1863, Mar. 3; b. Abbeville co., S. C., of Huguenot and Irish stock. He graduated from the Univ. of South Carolina 1809, studied law, and began practice 1812; soon settled in Charleston, and became eminent in his profession. He succeeded Hayne as atty.gen. of the state, holding the office 1822–30; became very unpopular by his uncompromising opposition to the nullification doctrines of Calhoun, and was almost the only man of wealth and eminence who remained faithful to the Union. He afterward served as dist.atty. and as a member of the state legislature, opposed the secession movement of 1860, and, though disliked for his political principles, was profoundly respected, and was chosen by the legislature to codify the laws of the state. This great work he completed only a short time before his death. He held the position of the foremost lawyer at the S. C. bar. For some time he was pres. of the S. C. Historical Soc. His *Biography* was published 1866. He died at Charleston.

PETIOLE, n. *pĕt′ĭ-ōl* [F. *pétiole*—from L. *petĭŏlus*, a little foot—from *pes* or *pedem*, a foot]: the foot-stalk of a leaf, connecting the blade with the stem (see Leaves): among *insects*, the very thin waist between the thorax and abdomen, furnished with two globular enlargements, called nodes. Pet′ioled, a. *-ōld*, having a foot-stalk. Pet′iolar, a. *-ō-lėr*, or Pet′iolary, a. *-lėr-ĭ*, pertaining to or growing on a small stalk; proceeding from a petiole; having a stalk or petiole. Pet′iolate, a. *-lāt*, growing on a petiole. Pet′iolule, n. *-lôl*, the stalk of a leaflet in a compound leaf.

PÉTION DE VILLENEUVE, *pā-te-ōng′ dĕh vēl-nĕv′*, JÉROME: noted for his part in the first French Revolution: 1753–94; b. Chartres; son of a procurator there. He was practicing as an advocate in his native city, when he was elected in 1789 a deputy of the *Tiers État* to the States-General. His out-and-out republican principles, and his facile oratory, sonorous rather than eloquent, quickly made him popular, though he had an essentially mediocre understanding, and was altogether windy and verbose. He was a prominent member of the Jacobin Club, and a great ally of Robespierre; the latter was called the 'Incorruptible,' and P. the 'Virtuous.' He was sent with Barnave and Latour-Maubourg to bring back the fugitive royal family from Varennes, and in the execution of this commission he acted in an extremely unfeeling manner. He afterward advocated the deposition of the king, and the appointment of a popularly elected regency; and with Robespierre received, 1791, Sep. 30, the honors of a public triumph. Nov. 18, he was elected *Maire de Paris* in Bailly's stead, the court favoring his election, to prevent that of Lafayette. In this capacity he encouraged the demonstrations of the lowest classes, and the arming of the populace. But as the catastrophe drew near, he awoke to a sense of its terrible nature, and sought in vain to arrest the torrent. On the triumph of the Terrorists, P.'s popularity declined, and he joined the Girondists. On the king's trial, he voted for death, but with delay of execution and appeal to the people, on which he became suspected of being a royalist, and of partaking in the treason of Dumouriez. He was thrown into prison, 1793, June 2, on the fall of the Gironde, but escaped, and joined the other Girondists at Caen. On the defeat of their army by that of the convention, he fled, 1793, July, into Bretagne, and in company with Buzot reached the neighborhood of Bordeaux, which, however, had already submitted. A short time afterward, P.'s and Buzot's corpses were found in a corn-field near St. Emilion, partly devoured by wolves. They were supposed to have died by their own hands. P.'s character has been defended by Madame de Genlis and Madame Roland. It appears that he was extremely virtuous in all his domestic relations; but, on the other hand, his public career shows him to have been weak, shallow, ostentatious, and vain. *Les Œuvres de Pétion*, containing his speeches and some small political treatises, were pub. 1793.

PETIT, n. *pĕt′ĭ* [F.]: little in figure; small; diminutive; mean: see PETTY. PETITE NATURE, *pĕ-tēt′ nă-tôr′* [F. *nature*, nature]: a term applied to such pictures as contain figures a little less in size than life. and yet have the effect of life size

PETITION, n. *pĕ-tĭsh′ŭn* [F. *pétition*—from L. *petītiōnem*, a request, a petition—from *peto*, I beg or ask: It. *petizione*]: an asking or seeking; a solemn or formal solicitation made by one party to another; a paper or document containing a written request or supplication; a prayer, or a part of one, addressed to God; an earnest entreaty: V. to solicit earnestly; to supplicate. PETI′TIONING, imp. PETI′TIONED, pp. *-ŭnd*. PETI′TIONER, n. *-ĕr*, one who petitions. PETI′TIONARY, a. *-ĕr-ĭ*, containing a petition or request. RIGHT OF PETITION, the right pertaining to the citizen of a free country to address the govt. with request for redress of any grievance. The right of the British subject to petition the sovereign or either house of parliament is a fundamental principle of the British constitution, and has been exercised from very early times. The earliest petitions were generally for redress of private wrongs, and the mode of trying them was judicial rather than legislative. Receivers and triers of petitions were appointed, and proclamation was made inviting all persons to resort to the receivers. The receivers, who were clerks or masters in chancery, transmitted the petitions to the triers, who were committees of prelates, peers, and judges, who examined into the alleged wrong, sometimes leaving the matter to the remedy of the ordinary courts, and sometimes transmitting the petition to the chancellor or the judges, or, if the common law afforded no redress, to parliament. Receivers and triers of petitions are still appointed by the house of lords at the opening of every parliament, though their functions have long since been transferred to parliament itself. The earlier petitions were generally addressed to the house of lords; the practice of petitioning the house of commons became frequent first in the reign of Henry IV. Since the revolution of 1688, the practice has been gradually introduced of petitioning parliament, not so much for the redress of specific grievances, as regarding general questions of public policy. In five years (ending 1842) the number of petitions presented to the house of commons was 70,072; in five years (ending 1872) 101,573.

In the United States this right is guaranteed to the citizen by provisions in the constitution. It may have reference to any legislative action and to any discretionary executive action. A petition, if addressed to a person having authority regarding its subject-matter, is by its very nature a privileged document, to which is allowed great freedom in comment on measures and on persons, and whose signers are not held responsible for errors of statement not made in malice. In legislative bodies the fact of presentation of petitions, with the referring of them to the proper committees, is made a part of the journal—a courteous reception improperly refused by congress at one period to petitions for action toward the abolition or the limitation of slavery.—SYN. of 'petition, n.': request; entreaty; supplication; solicitation; suit; a begging; memorial.

PETITION OF RIGHTS: declaration of certain rights and privileges of the British subject obtained from King Charles I. in his third parliament. It was so called because the commons stated their grievances in the form of a petition, refusing to accord the supplies till its prayer was granted. The P. professes to be a mere corroboration and explanation of the ancient constitution of the kingdom; and after reciting various statutes, recognizing the rights contended for, prays 'that no man be compelled to make or yield any gift, loan, benevolence, tax, or such like charge, without common consent by act of parliament; that none be called on to make answer for refusal so to do; that freemen be imprisoned or detained only by the law of the land, or by due process of law, and not by the king's special command, without any charge; that persons be not compelled to receive soldiers and mariners into their houses against the laws and customs of the realm; that commissions for proceeding by martial law be revoked.' The king at first eluded the petition, expressing in general terms his wish that right should be done according to the laws, and that his subjects should have no reason to complain of wrongs or oppressions; but at length, on both houses of parliament insisting on a fuller answer, he gave an unqualified assent 1628, June 26.—In modern usage, P. of R. in Britain denotes a mode of prosecuting a claim against the crown by a subject—said to have originated with Edward I.

PETITIO PRINCIPII, *pē-tĭsh'ĭ-ō prĭn-sĭp'ĭ-ī* ['a begging of the principle or question']: in logic, that species of vicious reasoning in which the proposition to be proved is assumed in the premises of the syllogism.

PETÖFI, *pĕh'tö-fē*, SANDOR (ALEXANDER): national modern poet of Hungary: 1823, Jan. 1—(prob.) 1849, July 31; b. at Little Körös, county of Pesth. His father, butcher and small landowner in Little Kumania, bore the name Petrovich (son of Peter)—indicating a Slavonic origin; which the poet when he came to manhood exchanged for the Magyar equivalent, Petöfi. P. was sent to the lyceum of the town of Schemnitz, where he neglected his studies, began to write verses, and showed extravagant fondness for theatricals, ultimately running away with a band of German strollers. His father found him and brought him home in quasi-custody. Again sent to school at Oedenburg, he almost immediately ran away, and enlisted as a common soldier; but after about two years in the army, a physician, pitying him, procured his discharge; and he went to Pápá, to complete his education—leaving 1842 to join a troop of comedians. His stage-attempts were utter failures, and he made his way to Presburg, and afterward to Pesth, where he got some employment as translator from the English and the French; thence he went to Debreczin on another venture as an actor, and with failure to the utmost. At last, being invited to contribute to a newspaper at Pesth, he

made his way on foot, nearly 200 m.—wearing shoes padded with straw and carrying in his bosom a MS. vol. of verses; his whole provision for the journey consisting of two florins, which he got from an old school-fellow. On arrival at Pesth he exchanged the name Petrovich for Petöfi. Within a few weeks he had troops of friends and a reputation.

He introduced himself to Vörösmarti, then the most popular poet of Hungary, who received the shabbily dressed stranger coldly; but when he had listened to P.'s verses, expressed his admiration, and from that time treated P. as a son. P. was almost at once received into the Literary National Circle, at whose expense was published his *Versek*, 1844. Other volumes followed with amazing rapidity, and obtained unbounded popularity; so that it was said of P. that 'he never went to bed at night, he never arose in the morning, without hearing his songs from the multitudinous passengers in the public streets.' He sprang almost at a bound into a position in Hungary similar in some respects to that of Burns in Scotland. In 1848 he became, by speech and pen, the advocate of the independence of Hungary. He was for some time a member of the diet, but 1848, Oct., he became a capt. in the Hungarian army; and in the beginning of 1849, he was appointed adjt. and sec. to Gen. Bem. He was in the battle of Segesvár, 1849, July 31, in which Bem's army was defeated with great slaughter; and he was never heard of afterward: it is believed that he was trampled to death in the flight, and that his body, defaced beyond recognition, was buried with the multitude of Magyar dead upon the field. His countrymen long believed that he was not dead, but a prisoner in an Austrian dungeon. Several false Petöfis have made their appearance since his death, and much spurious poetry has been published under his name. Lately, however, his countrymen have subscribed for the erection of a monument to his memory, and have purchased, with a view to its preservation, the house in which he was born at Little Körös. He left a widow—who married again—and one son. His brother, STEPHEN P., has gained some reputation as a poet.

His poems, 1,775 in number, were published in 10 vols. Most of them are lyrics, of which he published several collections, under the titles, *Cypress Leaves on Etelka's Grave; Pearls of Love; Starless Nights; Clouds.* The most celebrated of his narrative poems—also the longest—are *Janos, the Hero;* and *Istok, the Fool.* His earliest work was *The Village Hammer*, 1843; his latest, *The Assessor of the Judgment-seat*, 1849. A vol., containing a poem, *The Apostle*, was suppressed by the Austrian govt. after the pacification of Hungary. P. published a novel, and several vols. of tales, criticisms, and sketches of travel. A selection from his earlier pieces, translated into German, was pub. 1845; and several volumes of translations from his writings have since appeared in Germany. They have been translated also

into French, Flemish, Polish, Danish, and Italian; and an English version, comprising his finest poems, was published 1866 by Sir John Bowring. The quality of his poetry has been as fully recognized among foreigners as among his countrymen: thus, Grimm declared that 'Petöfi will rank among the very greatest poets of all times and tongues;' Henry Heine spoke rapturously of his 'rustic song, sweeter than that of the nightingale;' and Uhland avowed that only old age could prevent his learning Magyar, that he might enjoy P. in his native dress.

PETONG, n. *pĕ-tŏng′:* the Chinese name of a species of copper of a white color.

PETRA, *pē′trâ* (Heb. SELA, both names signifying 'Rock'): ancient capital of the Nabathæans, in the 'desert of Edom,' in n. Arabia, about 72 m. n.e. of Akabah—a town at the head of the Gulf of Akabah, an arm of the Red Sea. The situation is about 50 m. s. of the s. end of the Dead Sea. P. occupied a narrow rocky valley overhung by mountains, the highest and most celebrated of which is Mount Hor, where Aaron, first Hebrew high-priest, died: it was thus in the very heart of the region made memorable by the 40 years' wanderings of the Israelites. The aboriginal inhabitants were called *Horim* ('dwellers in caves'). It was then conquered by the Edomites or Idumæans (but it never became their capital); and, B.C. 3d or 4th c., it fell into the hands of the Nabathæans, an Arab tribe, who carried on a great transit-trade between the e. and w. parts of the world. It was finally subdued by the Romans A.D. 105, and afterward became the seat of a metropolitan; but was destroyed by the Mohammedans, and for 1,200 years its very site remained unknown to Europeans. In 1812 Burckhardt first entered the valley of ruins, and suggested that they were the remains of ancient Petra. Six years later, it was visited by Irby, Mangles, Banks, and Leigh, and 1828 by Laborde and Linant, and since by numerous travellers and tourists to the East, e.g., Bartlett, Porter, and Dean Stanley. Laborde's drawings give more vivid impression of the ruins of P. than any descriptions, however picturesque. These ruins stand in a small open irregular basin, about half a m. square, through which runs a brook, and are approached best through an extraordinary chasm or gorge about a mile long, called the Sîk, narrowing as it proceeds, till in some places the width is only 12 ft., while its rocky walls of rich brown or rose-colored sandstone tower to the height of 60 to 120 ft., and, according to Dean Stanley, to 250 ft. Hardly a ray of light can pierce this gloomy gorge, yet it was once the highway to P., and the remains of an ancient pavement can be traced beneath the brilliant oleanders that now cover the pathway. Such a narrow defile was capable of easy defense against invaders. All along the face of the rocky walls are rows of cave-tombs, hewn out of the solid stone, and ornamented with facades.

These are numerous elsewhere also. Originally, they were probably dwellings of the living, not of the dead—a supposition justified by examination of their interior; but when the Nabathæans built the city proper in the little basin of the hills, they were in all likelihood abandoned, and then set apart as the family-sepulchres of those who had formerly been 'dwellers in the clefts of the rocks.' The principal ruins are—1. *El-Khuzneh* ('the Treasure-house'), believed by the natives to contain, buried somewhere in its sacred inclosure, the treasures of Pharaoh. Its rich Roman façade directly faces the mouth of the gorge above described, and was the great temple of the Petræans: it is not built, but hewn out of the rocky hillside. 2. *The Theatre*, a magnificent building, capable of containing 3,000 to 4,000 spectators. At this point the defile begins to widen out into the rocky basin, whose inclosing mountain walls are full of grottoes, with elaborate classical façades. 3. *The Tomb with the Triple Range of Columns.* 4. *The Tomb with Latin Inscription.* 5. *The Deer* or *Convent*, a huge monolithic temple, hewn out of the side of a cliff, and facing Mount Hor. 6. *The Acropolis.* 7. *Kusr Farôn*, or Pharaoh's palace, the least dilapidated ruin of Petra. Most of the architecture is Greek, but there are also examples of the influence of Egypt, pyramidal forms being not unknown.

PETRARCH, *pē′trârk*, FRANCESCO; original name, *Francesco di Petracco*, which he subsequently changed to that (It. PETRARCA, *pā-trâr′kâ*) by which he is now known: first and greatest lyric poet of Italy; 1304, July 20—1374, July 18; b. Arezzo; son of a Florentine notary named Petracco, who belonged to the same political faction as the poet Dante, and went into exile with him and others 1302. When P. was about eight years of age, his father removed to Avignon, where the papal court was held; and here, and at the neighboring town of Carpentras, the youth studied grammar, rhetoric, and dialectics. Contrary to his own inclination, but in compliance with the wish of his father, he spent seven years in the study of law at Montpellier and Bologna; but 1326 his father died, and P. occupied himself partly with the gayeties of Avignon, and partly with classical studies, or rather the study of the Latin classics, as it was only toward the end of his life that he attempted to master Greek. At this time, he ranked among his friends the jurist Soranzo, John of Florence, the apostolic secretary, Jacopo Colonna, Bishop of Lombes in Gascony, and his brother, the Cardinal Giovanni, Azzo da Correggio, lord of Parma, and many other noble and learned personages. His illustrious admirers—among whom were emperors, popes, doges, kings, and sovereign-dukes—obviously thought themselves honored by their intimacy with the son of a poor notary, and some were even forward in proffering him their favor. But the great event in P.'s life (viewed in the light of its literary consequences) was his tenderly romantic and ultimately

pure passion for Laura—the golden-haired, beautiful Frenchwoman. Concerning Laura, it must be said that positive knowledge is lacking; she is reported to us by tradition only. Some obscurity also hangs over P.'s relation to this lady; but it is almost certain that she was no less a paragon of virtue than of loveliness. From P.'s poems we learn, concerning her, only that she was a young married woman, whom P. enshrined in a romantic adoration, but with whom his friendship never became intimate. The poet seems to have rendered homage to her not so much as a personal woman, but as his chosen personification of womanhood in the abstract. He met her 1327, Apr. 6, in the Church of St. Clara in Avignon, and at once and forever fell deeply in love with her. The lady (if we accept the traditions) was then of the age of 19, daughter of Audibert de Noves, and had been married two years to a gentleman of Avignon, named Hugues de Sade. For ten years, P. lived near her in the papal city, and frequently met her at church, in society, at festivities, etc. He sang her beauty and his love in those sonnets whose mellifluous conceits ravished the ears of his contemporaries, and still hold an unfading charm. Laura was not insensible to a worship which made an emperor (Charles IV.) beg to be introduced to her, and to be allowed to kiss her forehead; but she seems to have kept the too ardent poet at proper distance. In 1338 P. withdrew from Avignon to the romantic valley of Vaucluse, where he lived some years, spending his time almost solely in literary pursuits. A most brilliant honor awaited him at Rome, 1341, where, on Easter Day, he was crowned in the capitol with the laurel-wreath of the poet. The ceremonies which marked this coronation were a grotesque medley of pagan and Christian representations. P. was, however, as ardent a scholar as he was a poet; and throughout his whole life, he was occupied in the collection of Latin MSS., even copying some with his own hand. To obtain these, he travelled frequently throughout France, Germany, Italy, and Spain. His own Latin works were the first in modern times in which the language was classically written. The principal are his *Epistolæ*, consisting of letters to his numerous friends and acquaintances, and which rank as the best of his prose works; *De Vitis Virorum Illustrium; De Remediis utriusque Fortunæ; De Vita Solitaria; Rerum Memorandarum Libri IV.; De Contemptu Mundi*, etc. Besides his prose-epistles, P. wrote numerous epistles in Latin verse, eclogues, and an epic poem, *Africa*, on the subject of the second Punic war; and it was this production which obtained for him the laurel-wreath at Rome. P. showed little solicitude about the fate of his beautiful Italian verse, but built his hope of his name being remembered on his Latin poems, which, it has been said, are now remembered only because of his name. In 1353 he finally left Avignon, and passed the remainder of his life in Italy—partly at Milan, where he spent nearly ten years, partly at Parma, Mantua Padua, Verona,

Venice, and Rome. At last, 1370, he removed to Arquà, a little village prettily situated among the Euganean Hills, where he spent his closing years in close scholarly work, much annoyed by visitors, troubled with epileptic fits, not very rich, but serene in heart, and displaying in his correspondence a rational piety. He was found dead in his library on a July morning in 1374, his head dropped on a book.—P., though not knowing Greek, favored its study, and introduced the revival of classical learning in Europe. Literary culture was his ideal. He was not only far beyond his age in learning, but had risen above many of its prejudices and superstitions. He despised astrology, and the childish medicine of his times; but, on the other hand, he had no liking for the conceited skepticism of the mediæval *savants;* and, in his *De sui Ipsius et multorum aliorum Ignorantia*, he sharply attacked the irreligious speculations of those who had acquired a shallow free-thinking habit from the study of the Arabico-Aristotelian school of writers, such as Averrhoes. P. became an ecclesiastic, but was contented with one or two inconsiderable benefices, and refused all offers of higher ecclesiastical appointment. His intimates and supporters were among the rich and powerful; yet he advocated in his writings popular liberty and individual rights. He sang a pure love in verse surpassingly delicate and exquisite; yet his two sons were born to him by some woman unknown. Many such anomalies his character presents.—The Italian lyrics of P.—the chief of which are the *Rime*, or *Canzoniere*, in honor of Laura—have done far more to perpetuate his fame than all his other works. Of Italian prose, he has not left a line. The *Rime*, consisting of sonnets, canzonets, madrigals, were composed during a period of more than 40 years; and the later ones—in which P.'s love for Laura, long since laid in her grave, appears purified from all earthly taint, and beautiful with something of a beatific grace—have done as much to refine the Italian language as the *Divina Commedia* of Dante. Of his *Rime*, there have been probably more than 300 editions; the first that of Venice 1470; the most accurate that by Marsand (Padua 1819; Eng. trans. by Macgregor, 1851). Collective editions of his works have been published (Basel 1495, 1554, 1581, *et seq.*). Of numerous lives of him the principal are those of Bellutello, De Sades, Tiraboschi, Ugo Foscolo, and Geiger (1874); in Eng., Campbell (1841); Reeve in *Modern Classics for Eng. Reader* (1878).

PETRE, n. *pē'tėr* [Gr. *petra*, a rock]: a stone, as in saltpetre. PETREAN, a. *pē-trē'ăn*, pertaining to or resembling rock or stone.

PETREL, n. *pĕt'rĕl* [Sp. *petral*, a breast-leather for a horse: F. *poitrail*, the dewlap of an ox: It. *pettorale*, a breast-plate—from It. *petto*, L. *pectus*, a breast]: in *OE.*, a breast-plate.

PETREL, n. *pĕt′rĕl* [F. *pétrel*, the petrel, the little Peter's bird—from L. *Petrus*, Peter]: classed formerly as a genus (*Procellaria*) of ocean birds, ranked sometimes among *Laridæ* (q.v.), sometimes constituted into a separate family, *Procellaridæ;* but now generally classed as an order, *Tubinares*, from the tubular form of their nostrils. They are sub-divided into several genera and more than 100 species. Of these, some are distinguished by having the bill hooked at the tip, the extremity of the upper mandible being a hard nail, which appears as if it were articulated to the rest; and in all, the nostrils are united into a tube which lies along the back of the upper mandible. They possess great power of wing, and are among the most strictly oceanic of birds, being seen often at great distances from land. Among them are reckoned the Fulmars (q.v.), Shearwaters (q.v.), etc., and the smaller birds commonly designated PETRELS, of which the Stormy P. is a familiar example. The Stormy Petrels form the genus *Thalassidroma* of recent ornithological systems, the name [Gr. sea-runner] being given to them in allusion to their apparent running along the surface of the waves, which they do in a remarkable manner, with great rapidity, particularly when the sea is stormy, and the mollusks and other animals forming their food are brought in abundance to the surface—now descending into the very depth of the hollow between two waves, now touching their highest foamy crests, and flitting about with perfect safety and apparent delight. Hence also their name Petrel, a diminutive of Peter, from the apostle Peter's walking on the water (Matt. xiv. 29). From the frequency with which flocks of these birds are seen in stormy weather, or as heralds of a storm, they are very unfavorably regarded by sailors. They have very long and pointed wings, passing beyond the point of the tail; and the tail is square in some, slightly forked in others. Their flight resembles that of a swallow. They are seen in the seas of all parts of the world, but are more abundant in the s. than in the n. hemisphere. The names Stormy P. and Mother Carey's Chicken are sometimes appropriated particularly to *Thalassidroma pelagica*, a bird scarcely larger than a lark, and the smallest web-footed bird known, of sooty black color, with a little white on the wings and some near the tail. One species, the Fulmar P., breeding on the rocks of the Scilly Isles, St. Kilda, the Orkneys, Shetland Isles, etc., like many others of the family, generally has a quantity of oil in its stomach, which, when wounded or seized, it discharges by the mouth or nostrils. Of this the people of St. Kilda take advantage, by seizing the birds during incubation, when they sit so closely as to allow themselves to be taken with the hand, when the oil is collected in a vessel.

PETRESCENT, a. *pĕ-trĕs′sĕnt* [Gr. or L. *petra*, a rock]: becoming stone, or of a stony hardness. PETRES′CENCE, n. *-sĕns*, the process of converting into stone.

PETRIE, *pē'trē*, GEORGE, LL.D.: antiquarian: 1790-1866, Jan. 18; b. Dublin, Ireland. Having made an exhaustive study of the archeology of Ireland, he was appointed librarian of the Royal Hibernian Acad. 1830. He founded the museum and library of the Royal Irish Acad., obtained various prizes for essays on antiquarian subjects, and received from the govt. a literary pension of £300. Among his numerous works were *Picturesque Sketches in Ireland*, and *The Ecclesiastical Architecture of Ireland*. He died at Dublin.

PETRIE, *pē'trĭ*, W. M. FLINDERS: English Egyptologist: b. 1853, June 3 ——. He was educated privately, his object of study from an early age being Egyptology. He spent 1881–2 in Egypt, measuring and surveying with special instruments, his results being published in *Pyramids and Temples of Ghizeh* (1883). In 1884 he revisited Egypt, travelling at the cost of the Egyptian exploration fund, and again 1885. The results of his labors in 1884 are given in *Tanis;* the fruit of his researches 1885 was the discovery of the site and ruins of the long-lost Græco-Egyptian city Naukratis, on the Delta. He has ever since been occupied with Egyptian exploration, and his discoveries have been of the highest value to historical research. His published works are numerous.

PETRIFACTION, n. *pĕt'rĭ-făk'shŭn* [F. *pétrification*—from Gr. or L. *petra*, rock; L. *factus*, done or made]: conversion of an animal or vegetable substance into stony matter; process of changing into stone; the thing petrified. The word has fallen into disuse in science, giving place to the terms Fossil (q.v.), and Organic Remains. PET'RIFAC'TIVE, a. *-tĭv*, able or tending to convert into stone. PETRIFIC, a. *pĕ-trĭf'ĭk*, having power to change into stone. PETRIFY, v. *pĕt'rĭ-fī* [F. *pétrifier*, to petrify]: to convert animal or vegetable substances into stony matter; to fix in dumb amazement; to become stone. PET'RIFYING, imp.: ADJ. converting into stone. PET'RIFIED, pp. *-fīd:* ADJ. converted into stone; amazed; astounded.

PET'RIFIED FORESTS: forests converted into stone The most interesting example is Chalcedony Park, in e Arizona, 8 m. s. of Carriza, on the Atlantic and Pacific r.r.; it is said to contain at least a million tons, covering a thousand acres. The wood is beautifully agatized in all colors, due mostly to iron and manganese, and sections of it, 2–3 ft. diam., sawn and polished at Sioux Falls, S. Dakota, have been exhibited in e. cities. Some of the trunks are 150 ft. long and 10 ft. in diameter. Across a gulch, 45 ft. deep and 55 ft. wide, is 'Agate Bridge,' a petrified tree 3–4 ft. diam. and more than 100 ft. long. The trees lie broken and confused in a bed of volcanic ash and lava, and are visible only in gulches and basins where an overlying 20–30 ft. bed of sandstone has been worn away. The ashes and siliceous water, perhaps heated at the time, preserved and petrified the trees. Some of them have a hollow centre lined with crystals of amethyst or calcite. 'Lithodendron Valley,'

20 m. from Navajoe Springs in n. Arizona, is another locality where thousands of trees of as great size are found. They show the microscopic markings of the Araucarian pines, and are referred by some to the Jurassic, by others to the Cretaceous, period. Fossil wood abounds in the old volcanic regions of the west; also in other countries and geologic ages. On a branch of the Bay of Fundy, 1,400 ft. of carboniferous deposits have 68 successive levels of root-seams, with many petrified stumps standing where they grew, mostly Sigillariæ; one 4 ft. diam. The same condition is seen in an ancient forest in the Purbeck beds of the upper Oolite of England, where the trees were Cycads. In all these cases, as in other petrifactions, a particle of mineral matter was ready to take the place of every dissolved particle of the organism. Prof. Göppert steeped plants in siliceous and other mineral waters, and found that in a few days the lapidifying process was well begun. Texture and rings, etc., of wood would be preserved in such a process, and various color given by varying mineral matter in solution.

PETRO-, prefix, *pĕt-ro-* [Gr. *petros*, stone, rock]: pertaining to or consisting of stone or rock.

PETROBRU'SIANS: see HENRICIANS.

PETROGRAPHY, n. *pĕ-trŏg'ră-fĭ* [Gr. *petros*, a stone; *graphō*, I write]: in *geol.*, used in the same sense as petrology—thus, we speak of the 'petrographic' (*pĕt'rŏ-grăf'ĭk*) character of a formation, as opposed to its 'paleontological.'

PETROICA, *pē-troy'kâ:* genus of birds of family *Sylviadæ*, natives of Australia, nearly allied to the Redbreast, and to which its familiar name *Robin* has been given by the colonists. The song, call-note, and manners of *P. multicolor*, a species abundant in all s. parts of Australia, very much resemble those of the European bird, but its plumage is very different; the male having the head, throat, and back jet-black, the forehead snowy-white, one longitudinal and two oblique bands of white on the wings, and the breast bright scarlet; the female is brown, with red breast. There are several other species, birds of beautiful plumage.

PETROLEUM.

PETROLEUM, n. *pĕ-trō′lĕ-ŭm* [Gr. or L. *petra*, rock; L. *olĕŭm*, oil: It. *petrolio:* F. *pétrole*]: a liquid mineral pitch of a dark yellowish-brown color, so called from its oozing out of several strata like oil; known also as *mineral oil.* PETROLINE, n. *pĕt′rō-lĭn*, a substance resembling paraffin, obtained by distillation from the petroleum of Rangoon.—*Petroleum* is a natural liquid hydrocarbon, whose formation and genesis are in dispute among geologists. It is known by various names—*Rock Oil*, *Naphtha*, etc.—some incorrectly applied. In various places it has been known for many ages, but the immense development of the petroleum industry, including the drilling of wells and refining of the crude oil, is a growth since 1860. Oil had long been known to exist in the earth in this country, notably in the region of the headwaters of the Allegheny river. The early settlers had noticed it on the surface of the streams in that part of Pennsylvania, and had collected it in some places by absorbing it in blankets or cloths, and then expressing it. Even before their day the Indians, it is believed, had dug pits in which it collected. They are supposed to have used it for mixing with their paint for decorating their persons. Early in this century some was collected from wells which had been bored for salt. Natural gas also was evolved from these wells. In the winter of 1858–9 Col. E. L. Drake of New Haven, Conn., moved to the oil region, as it is now called, and began to drill a well for oil. This was at Titusville, Penn., on Oil Creek. 1859, Aug. 26, at the depth of 71 ft., oil was found. This is the classic date in the history of American petroleum. At once the oil-fever began, and every year saw more wells bored and more oil produced.

Until the discovery of the Pennsylvanian, the Burmese (Rangoon) P. or rock-oil was one of the best known. It is obtained in a treacly state by sinking wells about 60 ft. deep, and consists of several fluid hydrocarbons, with 10 or 11 per cent. of the solid hydrocarbon paraffin. The different grades of hydrocarbons that are produced from it are highly prized as burning and lubricating oils, and for removing greasy stains. P. is found abundantly at Baku, on the Caspian Sea, where it is manufactured on a very large scale, and exported over Russia and e. Europe in specially constructed boats and trains. It is largely used in its crude state as fuel for engines.

Prominent among the wonders of our time, however, as regards new fields of industry and wealth, are the discoveries of the petroleum regions of the United States. The principal supplies are obtained in Penn., W. Va., and Ohio, a considerable quantity being obtained also in w. Canada. The Ohio oil, known to the trade as Lima oil, is very impure, and has presented many obstacles to economical refining. The Canada oil is rich in sulphur and phosphorous compounds, which give it a highly disagreeable odor. Other regions in N. America produce it, but the Pennsylvania yield is six or seven times greater than all the rest put together. It was known to

the Jesuit missionaries 1627 as a natural curiosity, and was spoken of in the 18th c. as Seneca oil, from the Seneca Indians in N. Y., who kindled it in their religious ceremonies. Sources have lately been found in the Argentine Republic and in Ferghana (Russian Asia).

There is much curiosity respecting the origin of these great natural sources of petroleum. It is the opinion of many geologists that it has in most cases been produced by the decomposition of both vegetable and animal matters. In this respect it would differ from coal, product of the decay of vegetable matter alone. It appears that the Pennsylvanian oil proceeds from shales of Carboniferous age; the Canadian, from those of Devonian age. In both countries the oil is found in cavities in sandstone, and has therefore been derived from subjacent rocks. It is now known that P. has formed in rocks of nearly all geological ages. Prof. Dana, mineralogist, says that the conditions favorable to the formation of native P., as shown by the characteristics of the deposits in which it is found, are: (1) diffusion of organic material through a fine mud or clay; (2) the material in a very finely divided state; and (3), as consequence of the preceding, the atmosphere excluded as far as possible from the material undergoing decomposition.

In Penn. the first borings for P. took place 1859, in which year 82,000 barrels (reckoned at 43 gallons each) were obtained; in 1861 the produce had reached 2 million barrels; since then, as a rule, it has increased from year to year. In 1879 the annual production of the United States was reported about 15,000,000 barrels (600 million gallons). In 1878 the export from the United States had an aggregate value of $46,000,000—an enormous sum when it is remembered that the first exports took place so recently as 1861. Of late years, this trade is said to have employed in N. America as many hands as coal-mining and the working of iron: 28,249,597 bbls. were produced 1887.

Laws have been passed in most civilized countries to regulate the use of petroleum, such as limiting the amount to be kept in store, and prohibiting the sale of such kinds as give off an inflammable vapor below a certain degree of temperature. There are usually special warehouses for the reception of petroleum, and special cars with iron tanks for its transportation. But the principal method of transportation now in use in the United States for the crude oil is by pipes. Immensely long lines of pipes are now used, through which the oil is pumped to the refineries or centres of distribution from the oil regions. To such a scale has this been carried that it is even proposed to construct a 'pipe line,' as they are called, from the Russian P.-field at Baku, on the Caspian Sea, to the shores of the Baltic Sea.

In Canada there are four areas in which oil-springs are found—two in Enniskillen, a third in Mosa and Oxford townships, a fourth in Tilsonburg. The Canadian oil, as may be inferred from what has been said above.

is more troublesome to purify than that found in the U. S. Although it occurs abundantly, the production 1878 was not more on the average than 1,200 bbls. per day. Natural petroleums and the paraffin oils distilled from shale or coal very closely resemble each other, so that both kinds are used for the same purposes. In Scotland the paraffin-oil industry is important, yielding not much less than 30 million gallons of crude oil annually, from which solid paraffin and other products are obtained, as well as lamp oil. See PARAFFIN OIL: SHALE. In Prussian Saxony the same or very similar products are distilled on nearly as large a scale from an earthy lignite found in the brown coal formation between Weissenfels and Zeitz. In Galicia, chiefly in the Boryslaw dist., there are both a native oil and a native bitumen (ozokerite) found, which 1873 yielded burning oil and paraffin to the value of nearly $2,500,000; and the industry is still prospering. There appears to be a considerable supply of P. also in Roumania.

In 1865 a shale was discovered in New S. Wales, similar to the Boghead coal or Torbanehill mineral of Scotland, but richer in oil, and more free from sulphur. When distilled at Sydney, from 100 to 160 gallons of oil were obtained from one ton of shale. The seam in Hartley district is 5½ ft. thick. Of this substance, the S. Wales Shale and Oil Company raised 15,598 tons 1876, valued at about $225,000; and there appears to be an extensive deposit of it in the district. These shale-oil industries (see PARAFFIN OIL) are held in check by the low price at which American petroleum is usually sold.

The P. wells are drilled by the regular methods in use for artesian wells. Most of the present American wells are more than 200 ft., and many are more than 1,000 ft., in depth. They are from 6 inches upward in diameter. A wrought-iron tube, less in diameter than the bore, is inserted, and by annular packing, at varying depths, surface-water is excluded. Many of the wells have a second pipe, with a pump inserted to raise the oil; others are flowing wells. In 1861 the first large *flowing* well was struck—that is, a well up which the oil rose so profusely as to flow over the surface, yielding 1,000 bbls. (of 40 gallons each) per day. 'No mining enterprise had ever offered such sudden fortunes. A well costing a few thousand dollars might yield from 100 to 2,000 bbls. of oil daily with no expense for pumping. The Noble well yielded, in little more than one year, 500,000 bbls. of oil. The Sherman flowed 450,000 bbls. in about two years.'

It often happens that a well begins to run down in yield. In such cases it is often 'shot,' or 'torpedoed.' A cartridge of nitro-glycerine is lowered to the bottom and is exploded by a percussion-cap on which a weight is dropped, or by electricity. This opens cavities and cracks in the surrounding rock and increases the yield for a varying period.

The process of manufacturing or refining P. is very simple. It consists in distilling the crude oil. This involves.

however, more than a mere evaporation. The hydrocarbons of high carbon percentage have a tendency, on exposure to heat, to split up into those of lower boiling-point, or, what is the same thing, of lower carbon percentage. This process is termed 'cracking.' As the object of the refiner is to produce a medium grade of oil, he endeavors to secure a larger quantity by decomposing the heavier products by this method. The stills generally are sheet-iron, sometimes cast-iron, tanks, in which the oil is heated. As the lighter products evaporate, they are collected and separated for use in the manufacture of water-gas and naptha-gas, for gas machines, for cleansing processes, etc. As the intermediate portions come over, they are condensed and separated as kerosene oil. The heavier products are used for lubricating oils and other purposes. 'Cracking' is brought about by making the still high, so as to keep the gasified hydrocarbons a long time in the hot body of the apparatus, and by introducing superheated steam at the proper period.

To make the kerosene colorless, bleaching is required. This is effected by agitating it with oil of vitriol, concentrated sulphuric acid. This decomposes the organic coloring matter, which separates with the acid in a layer of 'sludge acid.' It is thrown away. The oil is freed from traces of acid by agitation with an alkali, such as caustic soda, and is ready for use.

Owing to the comparative stability of the hydrocarbons present in P., and the absence of the more complicated oxygen or nitrogenholding organic compounds, it has proved singularly barren in the production of side products. In this way it offers a great contrast to coal-tar, the source of so many complicated compounds, including colors, aniline and others, which are triumphs of synthetic chemistry.

During the year 1905, the oil fields of the United States produced 134,717,580 barrels of petroleum, as against 117,080,960 barrels in 1904. This production was greater by 17,636,620 barrels than that of any previous year. It is an increase over the production of the year 1900 of 71,097,051 barrels, or considerably more than any total yearly production up to 1902. The production of petroleum in the United States has more than doubled within the last six years. The increase is in the heavier grades of the fuel class, the production of lighter or illuminating oils having remained constant.

It is significant, however, that the value of the oil production for the year 1905 was $17,018,056 less than for the year 1904. The 117,080,960 barrels of oil produced in 1904 were valued at $101,175,455 whereas the 134,717,580 barrels of 1905 are rated at only $84,157,399.

Of the production of the year 1905, 70,474,078 barrels are from the Gulf and California fields. This is almost exactly the quantity by which the production of the year 1905 exceeds that of the year 1900. The petroleum of

the Gulf and California fields is of the heavier variety and has a residue of asphaltum. Oil of this quality, although capable of producing a small percentage of illuminating oil, is principally valuable as a fuel. The consumption of heavy oils must therefore depend on the demand for this kind of fuel. The growth of this demand is bound to take time.

Prior to the year 1904 the greater part of the lighter grades of petroleum that are especially adaptable to the manufacture of the illuminating oils came from the Appalachian and the Lima-Indiana fields. For a number of years the combined production of the two fields has been remarkably constant. During the time between the years 1894–1903, inclusive, it has averaged about 55,500,000 barrels a year. During the year 1904 the Appalachian field showed a slight falling off in production as compared with 1903, and in 1905 a decrease in production of 6.5 per cent as compared with that of 1904. The Lima-Indiana and Illinois field held its production in 1904, but fell off 9.6 per cent in the year 1905 as compared with the preceding year, notwithstanding the fact that the 181,084 barrels of oil produced by the state of Illinois were added to the production of that field.

The consumption of illuminating oil from 1894 to 1903 slightly exceeded the production. The stocks held by the large pipe-line companies, which amounted to 33,772,823 barrels at the end of the year 1897, were reduced to 20,772,823 barrels at the end of the year 1903. During the year 1904 there was a consumption of 55,968,171 barrels against a production of 61,715,278 barrels, and in 1905 a consumption of 60,875,677 barrels against a production of 63,855,710 barrels. These two years caused an increase in the stocks held of 8,717,140 barrels.

PETROLOGY: [Gr. *petros;* a rock; *logos,* treatise.] (John Pinkerton in 1811 wrote 'petralogy'): A treatise on rocks in the broadest sense; their characters, origins, distribution, economic value, description and classification. Petrography is confined to the last two subjects.

ROCKS, in the comprehensive geological sense, are the constituent parts of the globe we inhabit; and there is strong reason to believe also of at least some other bodies in space. According to the most prevalent view of scientific men the rocks (solid and liquid) which constitute our earth were formed from dissociated ultra gaseous matter in consequence of the cooling of the incandescent mass supposed by La Place to have occupied planetary space. The progress from protyle to definite chemical compounds was effected by progressive combinations, disintegrations, and re-combinations of the seventy-seven odd elements we now know, and doubtless others, as the temperature was lowered and chemical unions resulted, in part, passing through the gaseous and liquid, to the solid state of matter. These bodies, originally glassy slags, were dissolved and redistributed by the acid rains, or changed by segregation of definite compounds of some of the other constituent elements within their mass to form bodies with characteristic physical and chemical properties called minerals. A further cooling permitted water, that chief rock, which covers two-thirds of the terrestrial surface, to rest on the hardened crust, which its waves, and the rains and rivers emanating from it mechanically abraded, and distributed the fragments in layers over wide areas of the sea bottom; thus giving rise to sedimentary or clastic rocks.

The origin of the various kinds of rocks may be therefore: *igneous,* which have resulted from the cooling of a fused mass (usually containing silica, and alumina together with other substances); *aqueous* (sedimentary or elastic), which have resulted from a grinding up and redistributing of the materials of the solid crust of the earth; *œolian,* which have resulted from the action of the atmosphere; *organic,* which are products of organized or living creatures (such as the coral reefs, many limestones, coal and guano beds, etc.); or *derivative* like mineral oil, natural gas, and the water of the oceans and springs, all of which in the geological sense are rocks. See ROCKS.

PETROLOGY.

The distinction between a rock and a mineral is not always obvious. A rock need not have, a mineral must have, a definite chemical composition. For example the aphanitic or glass-like igneous rocks vary largely in their respective contents of Silicon, Aluminum, Calcium, Magnesium, etc. Among the clastic or sedimentary rocks a sandstone may be composed of any materials so long as the grains are not larger than those of what is called 'sand' (i.e. about 0.25 c.m.) The character of the grains will depend upon the rocks from which they were abraded. Some sandstones consist largely of grains of hard quartz, while others contain softer silicates and other materials. If one examine a beach for some miles above and below the mouth of a river it will be found that the character of the region through which the river has flowed may be recognized from the sand of the beach. The coarser, because harder, constituents of the rocks forming its bed will be found nearest to the mouth, while the lighter, softer and finer constituents will increase in amount in proportion to the distance from it.

Building Stones.—Every government which conducts a census should include in its statistics the output of rocks for building stone. The U. S. (Min. Res. 1905, U.S.G.S.) enumerates Granite, Trap rock, Sandstone (Bluestone), Marble, and Limestone. The value of these materials quarried in the U. S. in 1905 was $63,798,748.

Petrography.—It should be premised that the rocks most difficult to classify are the igneous and metamorphic.

In the earlier attempts to define these natural objects the distinction between rocks and minerals was not sharply drawn. A commonly accepted definition of 'rock' is 'a substance constituting a mass of geological importance.' The objection to this definition is the difficulty of determining what is 'of geological importance,' it may be a large mass of the most heterogeneous material (as in widely spread moraines, Kames, and boulder-till) or fine veins of Gabbro so limited in area that they would not be used as geological units were it not for the light their origin sheds upon the history of the formation with which they are associated.

Linnæus (1707–1778) had the foresight to propose a classification of inorganic nature into Petræ, Mineræ, and Fossilia, which would naturally and in their proper order form the subject of Petrology, Mineralogy, and Palæontology, but like other great geniuses he planned better than he knew, or had time to elaborate. Werner (1750–1817) proposed to divide rocks into (1) Primitive, (2) Transition, (3) Stratified, and (4) Alluvial formations, but this classification was vitiated by mingling with it assumptions as to their respective ages and origins. Thus No. 1 contained granite, clay slate, limestone and many other dissimilar objects; No. 3 associated sandstone, rock salt, and basalt, etc. Haüy (1743–1822) divided rocks into (1) Stony and Saline;

(2) Combustible Non-metallic; (3) Metallic; (4) Rocks variously considered igneous or aqueous; (5) Volcanic.

Pinkerton (1758–1826) proposed to divide rocks into (1) Siderous (iron bearing); (2) Silicious; (3) Argillaceous; (4) Magnesian; (5) Calcareous; (6) Carbonaceous, with 'accidential' domains which are unimportant except the last, 'Volcanic.'

Cordier in 1815 proposed a method of investigation by chemical, microscopical, and mechanical tests including rocks too fine grained to be differentiated by the kind of examination then used. For the first time texture was made an important element of distinction.

John Macculloch (1773–1835) in 1822 divided rocks into primary (older) and secondary (newer) with a third division containing rocks common to both the others.

Von Leonhard in 1823 first brought out the importance of character independent of age or origin in rocks. He gave close attention to structure and recognized four divisions, viz.: (1) Heterogeneous; (2) Homogeneous; (3) Fragmental; (4) Loose; with Coals in an appendix. Brongniart (1770–1847) proposed to consider rocks as (1) Homogeneous; (2) Heterogeneous. The further sub-divisions were mineralogical.

Many distinguished chemists attempted with meagre results to attain to a classification through mass analysis. Abich in 1841 introduced feldspar as a means of discriminating between various (eruptive) rocks. Bunsen suggested trachytic and pyroxenic magmas as the origin of all igneous rocks. Naumann rendered great service to this division of the subject of geology but did not aid materially in putting on a permanent basis the classification of rocks. Von Cotta published in 1855 his *Gesteinslehre* which, so far as the igneous rocks are concerned, was a permanent contribution to the subject, of great value. He divided igneous rocks vertically into Plutonic (or those which had solidified slowly and under pressure deep in the earth), and Volcanic, those which had congealed rapidly and under moderate pressure. Horizontally each of these classes was divided into Acidic (or those containing 55–80 p.c. of Silica), and Basic (or those containing 45–60 p.c. of Silica).

While great strides in this science have been made since von Cotta's day this simple and easily applicable scheme is still the most convenient for the field geologist who has to determine, without laboratory appliances, igneous and metamorphic rocks.

Roth in 1861 attempted a chemical classification of rocks, but abandoned it and arranged the igneous rocks by their feldspars. Scheerer about the same time formulated a similar system and adhered to it.

The present status of petrography began with the application of the polarising microscope to the study of thin sections of rocks. It is difficult to establish the precise period or individual to be credited with this important step forward. To Vogelsang in the 'sixties of the last

century is ascribed by some this distinction, but its first successful application seems to have been made by Zirkel. The method was known and taught in Freiberg (and probably in other German technical schools) about 1868–9. Zirkel's work on *The Microscopic Constitution of Minerals and Rocks* appeared in 1873. The influence of Rosenbusch, who published his *Microscopic Physiography of Massive Rocks* in 1877, has been for many years greater in this field than even that of his closest rival Zirkel; but Tschermak, von Lasaulx; Judd and Teall, in England; Williams and Wadsworth in the United States, and many others have advanced the study to the front rank of the researches of inorganic natural history.

Löwinson-Lessing devised a scheme for the arrangement of Eruptives as silicated rocks with Silica as the basis of primary classification, which was communicated to the Seventh International Geological Congress at St. Petersburg in 1897. Walther proposed at this same Congress a classification into (1) Mechanical (composed of fragments, subdivided by form and size); (2) Chemical (precipitates and sublimates). Further divisions by occurrence are (3) Organic (products of living things), (4) Volcanic (magmas).

In 1902 a *Quantitative Classification of Igneous Rocks* was issued by Messrs. Cross, Iddings, Pirsson, and Washington which, in spite of the difficulty in mastering its terms, is clearly the most important and systematic presentation yet attempted of this study so difficult to define. The above sketch of the progress of petrography has followed in the main the introductory history of the subject by these authors in the order in which the facts have been stated, but with some exceptions.

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PETRONIUS, *pē-trō′nĭ-ŭs*, C. (Petro′nius Ar′biter): d. B.C. 66: Roman voluptuary at the court of Nero. He was at one time proconsul of Bithynia, was subsequently appointed consul, and is certified as having performed his official duties with energy and prudence. But his grand ambition was to shine as a court-exquisite. He was a kind of Roman *Beau Brummel*, and Nero thought as highly of him as did the Prince Regent of the famous Beau. He was intrusted by his imperial master and companion with the charge of the royal entertainments, and thus obtained (according to Tacitus) the title of *Arbiter Elegantiæ.* Nero would not venture to pronounce anything *comme il faut* until it had received the approval of the oracle of Roman fashion. The influence which he thus acquired was the cause of his ruin. Tigellinus, another favorite of Nero, conceived a hatred of P., brought false accusations against him, and succeeded in getting his whole household arrested. P. saw that his destruction was inevitable, and committed suicide, but in a languid and graceful style, such, he thought, as became his life. He opened some veins, but every new and then applied bandages to them, and thus stopped the flow of blood, so that he was for a while enabled to gossip gayly with his friends, and even to appear in the streets of Cumæ before he died. We

are told that he wrote, sealed, and dispatched to Nero, a few hours before his death, a paper containing an account of the tyrant's crimes and flagitious deeds. It has been generally supposed that Petronius is the author of a well-known work entitled, in the oldest MSS., *Petronii Aribitri Satyricon*, a series of fragments belonging apparently to a very extensive comic novel or romance (see NOVELS), the greater portion of which has perished; but there is really no satisfactory evidence either to prove or to disprove his authorship. It is probable, however, that the work belongs to the 1st century after Christ. The fragments exhibit a horrible picture of the depravity of the times; but there is no indication that the author disapproves of what he describes. The *editio princeps* of the fragments appeared at Venice 1499; later editions are those of Burmann (Traj. ad. Rhen. 1709; 2d ed. Amst. 1743) and of Bücheler (3d ed. Berl. 1882).

PETROPOLIS, *pē-trŏp'ō-lĭs*, Port. *pā-tro-po-lēs'*: town in the state of Rio de Janeiro, Brazil; about 25 m. n. from the city of Rio de Janeiro with which it is connected by railroad. Founded for the benefit of poor German immigrants, it has become a prosperous town; has a fine park and several creditable public buildings. On account of its beautiful and elevated situation, it is a favorite resort in summer. There is a large cotton-mill near the town.—Pop. about 10,000.

PETROSAL, n. *pĕt-rōz'ăl* [L. *petrōsŭs*, full of rocks—from *petra*, a rock]: the dense and solid mass of bone forming a part of the temporal bone and entering into the base of the skull; the ear-capsule bone in a fish.

PETROSILEX, n. *pĕt'rō-sī'lĕks* [L. *petra*, rock; *silex*, flint]; rock-flint or hornstone. PET'ROSILI'CEOUS, a. *-sĭ-lĭsh'ŭs*, consisting of or containing petrosilex.

PETROUS, a. *pĕt'rŭs* [L. *petrōsus*, full of rocks—from *petra*, a stone]: hard; stony; in *anat.*, applied to a dense, solid mass of bone, forming a part of the temporal bone, in which the organs of hearing are situated; designating a ganglion situated in the lower border of the petrous portion of the temporal bone. PETROSAL, a. *pĕt-rōz'ăl*, in same sense as 'petrous.' PETROSAL NERVE, a branch of the vidian nerve.

PETRUCCI, *pā-trô'chē*, OTTAVIANO DE ('PETRUTIUS FOROSEMPRONENSIS'): Italian printer: b. Fossombrone, near Urbino, Italy, 1466; d. 1539. He invented the art of printing music by means of movable types, each note being cast complete with a staff line, and was granted sole right to its use for 20 years by the council of Venice. From 1498–1511 he prospered, but then attempted further experiments which proved so expensive that he was forced to sell his rights. He then secured rights for the Papal States for 15 years and established himself in business in his native town, but never achieved any con-

siderable success there. The specimens remaining of his work are exceedingly neat and exact, and are both rare and valuable.

PETTENKOFER, *pĕt'tĕn-kō-fĕr*, MAX VON: German chemist: b. near Neuburg, 1818, Dec. 3; d. 1901. He was graduated from the University of Munich in 1843 and in 1847 became professor of chemistry there. He was the earliest in Germany to give practical instruction in hygiene, which he began to do in 1866, and his name has since been associated with advances in that direction. He made many valuable contributions to science on subjects as various as gold-refining, gas-making, ventilation, clothing, the influence of soils on health, epidemics,—his researches in regard to ventilation and cholera being of especial value. He was the first to demonstrate that cholera is propagated by a germ and that local conditions are largely responsible for the spread of the disease. He published *Untersuchungen über die Verbreitungsart der Cholera* (1885); *Ueber den Luftwechsel in Wohngebäuden* (1858); *Populäre Vorträge; Beziehungen der Luft zu Kleidung, Wohnung und Baden;* etc.

PETTICOAT, n. *pĕt'tĭ-kōt* [F. *petit*, little, petty, and Eng. *coat*]: a loose under-garment worn by females. PETTICOAT GOVERNMENT, female rule; dominion or influence of a woman. PETTICOAT or DRAFT PIPE in a locomotive: the pipe through which the exhaust-steam is conducted to the exhaust-nozzles in the smoke-box, thus creating a partial vacuum in the smoke-box, which sucks the smoke and gases out of the flues with great power, and forces them out into the open air by the blast or the action of the exhaust steam.

PETTIE, *pĕt'ĭ*, JOHN: Scottish painter: b. Edinburgh, 1839, March 17; d. Hastings, 1893, Feb. 21. He exhibited for the first time in the Royal Scottish Academy *The Prison Pet* (1859); went to London in 1862, and was elected Royal Academician 1875. His work as a historical painter was much admired and his pictures sold well. Of these may be mentioned *Disgrace of Wolsey* (1869); *Juliet and Friar Laurence* (1874); *Flag of Truce* (1873); *Duke of Monmouth before James II.* (1882).

PETTIFOGGER, n. *pĕt'tĭ-fŏg'gẽr* [F. *petit*, little, mean, and OE. *fog*, to resort to mean expedients: Ger. *fug*, convenience, opportunity: comp. Gael. *fogair*, chase, hunt: O. Dut. *focker*, an engrosser of wares and commodities: the word has also been derived from F. *voguer*, to row]: a lawyer who is employed in small or mean business. PET'TIFOG'GING, a. conducting inferior or mean law business; playing the part of a pettifogger. PET'TIFOG'GERY, a. *-gẽr-ĭ*, the practice or the acts of a pettifogger; tricks; quibbles.

PETTIGREW, *pĕt'ĭ-grô*, JAMES JOHNSTON: American soldier: b. 1828, July 4: d. Bunker Hill, Va., 1863,

July 17. He was graduated from the University of North Carolina in 1847, was professor in the naval observatory at Washington for a year when he resigned to study law in Charleston, S. C. He was admitted to the bar in 1849 and for a time acted as secretary of legation at Madrid, returning in 1852 to Charleston where he practised law with much success. In 1856 he was elected to the legislature and after the opening of the Civil War proved himself an able engineer in the construction of batteries and was appointed brigadier-general in the Confederate army in 1862. He defended Richmond against General Stoneman in 1863 and at the battle of Gettysburg led his brigade in Hill's corps against the Iron Brigade. He was in command of Heth's division on the third day and participated in the famous charge on Cemetery Ridge. In the retreat which followed the battle he was fatally wounded.

PETTIGREW, Richard Franklin: American lawyer and political leader: b. Ludlow, Vt., 1848, July 23. He was educated at Beloit College, Wis., and at the law school of the University of Wisconsin. In 1869 he went to Dakota as surveyor in the United States service, and located at Sioux Falls where he engaged in surveying and real estate business, and after 1872 in the practice of law. He became prominent also in public life; was a member of the legislative council of Dakota 1877–81, represented the Territory in Congress in 1881–3, was a member of the Constitutional Convention in 1883, and of the Territorial Council in 1884–5. After the admission of South Dakota as a State, he was elected to the United States Senate on the Republican ticket, where he served from 1889 to 1901. In 1896 he left the Republican party on account of its opposition to the free coinage of silver, and its attitude toward the trusts, and in the elections of that year and of 1900 supported Bryan for the presidency. After the Spanish War he led the opposition in the senate against the annexation of the Philippines and the imperialistic policy.

PETTINGILL, *pĕt'ĭn-gĭl*, John Hancock: theological writer: 1815, May 11—1887, Feb. 27; b. Manchester, Vt. He graduated at Yale 1837, and at Union Theol. Seminary; was teacher in the deaf and dumb institution, New York; Congl. pastor at S. Dennis, Mass., Westbrook, Conn., and Saxonville, Mass.; dist. sec. of the Amer. Board of For. Missions 1852–60, living at Albany, N. Y.; visited Turkish missions 1856–7; and was chaplain of Amer. Seamen's Friend Soc. at Antwerp 1866–7, where he received govt. commendation for services to cholera patients. Returning, he published *Homiletical Index* (1877), and advocated the 'annihilation' doctrine (immortality dependent on Christian faith and discipleship) in *Theol. Trilemma* (1878); *Platonism versus Christianity*, and *Bible Terminology* (1881); *Life Everlasting*

(1882); *The Unspeakable Gift* (1884); *Views and Reviews in Eschatology* (1887). His books had wide circulation, and made many converts in this country and abroad, where they were translated into several languages.

PETTISH, PETTISHLY, PETTISHNESS: see under PET 1.

PETTIT, *pĕt′ĭt*, CHARLES: 1736–1806, Sep. 4; b. N. J. He was commissioned surrogate 1767, two years later became provincial deputy-sec., and began law practice 1770. He was the governor's sec. 1772–74 and 1776–78, a member of the council 1773, and asst. quartermaster-gen. 1778 till the close of the revolution. When peace was restored, he became a merchant in Philadelphia; was a member of the Penn. legislature 1783–4 and of congress 1785–87. He was a member of the Harrisburg convention, and strongly favored the adoption of the federal constitution; devised the funding system adopted by the state of Penn., was a member of the American Philosophical Soc., was for many years a trustee of the Univ. of Pennsylvania, and for seven years previous to his death was pres. of a prominent insurance company. He died at Philadelphia.

PETTITOES, n. plu. *pĕt′tĭ-tōz* [Norm. F. *petots*, little feet]: the toes or feet of a pig; *sportively*, applied to the human feet.

PETTO, n. *pĕt′tō* [It. *petto*, the breast—from L. *pectus*, the breast]: the breast. IN PETTO, in secrecy; in reserve —a phrase applied to the pope, who is accustomed to make appointments *in secret*.

PETTY, a. *pĕt′tĭ* [F. *petit*, little, small: comp. It. *piccolo:* Sp. *pequeno*, small: W. *pitw*, little, small: W. *pid*, a point]: small in amount; inferior; little; inconsiderable; trivial. PET′TILY, ad. *-tĭ-lĭ*. PET′TINESS, n. *-nĕs*, smallness; littleness; unimportance. PETTY CASH, money kept in hand to meet current expenses. PETTY-CASH BOOK, a book for entering small receipts and payments. PETTY JURY, in the United States, usually PETIT JURY, as distinguished from GRAND JURY, a jury of 12 men to try ordinary or small cases in a court. PETTY BAG OFFICE, in Britain, office of the court of chancery, abolished 1874, and its miscellaneous duties transferred mostly to officials of the supreme court—so named from the writs being kept in a little sack. PETTY SESSIONS, court constituted by two or more justices of the peace, sitting in administration of their ordinary jurisdiction: see JUSTICE OF THE PEACE.—SYN. of 'petty': trivial; unimportant; frivolous; little; diminutive; inconsiderable; trifling; inferior; small.

PETTY, *pĕt′tĭ*, Sir WILLIAM: 1623, May 16—1687, Dec. 16; b. Romsey, Hampshire, England. After attending school near home, he studied in France, and became an officer in the English navy, but resigned in order to study medicine in Paris. He practiced his profession at Oxford, secured a college fellowship 1648, and two

years later was elected prof. of anatomy at the Univ. of Oxford. In 1651 he was called to the chair of medicine in Gresham College, and the next year was appointed physician to the army in Ireland. He rendered distinguished service in surveying large tracts of forfeited land in Ireland, and was sec. to the lord lieut. of that country; became a member of parliament 1658, was made surveyor-gen. of Ireland, and was knighted 1661. He made numerous discoveries and inventions, among the latter a pentagraph for copying drawings. He engaged in various speculations which made him wealthy. He was one of the first of the great writers on political economy, and has been called the principal English founder of the science. He wrote extensively also on politics, education, and finance. He died at Westminster.

PET′TY OF′FICERS, in the Navy: upper class of seamen, analogous to non-commissioned officers in the army. They comprise the men responsible for proper care of the several portions of the ship, the foremen of artificers, the signalmen, and many others. A ship's efficiency is greatly dependent on this useful class of sailors. They are divided into three classes: chief P. O.; first-class working P. O.; and second-class working P. O. They are appointed and can be degraded by the captain of the ship.

PETULANT, a. *pĕt′ū-lănt* [F. *pétulant*—from L. *pet′ulans*, *petulan′tem*, pert, saucy—perhaps from *peto*, I attack or assail: It. *petulante*]: irritable or pert from fretfulness or ill-humor; saucy; capriciously peevish; freakish in passion. PET′ULANTLY, ad. *-lĭ*. PET′ULANCE, n. *-lăns* [F.—L.], or PET′ULANCY, n. *-lăn-sĭ*, peevishness; saucy pertness.—SYN. of 'petulant': fretful; cross; peevish; irritable; captious; cavilling; ill-humored; pert.

PETUNIA, n. plu. *pĕ-tū′nĭ-ă* [Brazilian *petun*, tobacco —so named from its affinity with *Nicotiana*]: genus of plants of nat. order *Solanaceæ*, natives of warmer parts of America; herbaceous plants, very nearly allied to Tobacco, and with some similarity to it in general appearance of the foliage, which has also a slight viscidity, and emits when handled a disagreeable smell. The flowers are very beautiful, especially in closely planted beds; and varieties improved by cultivation are among favorite ornaments of greenhouses and flower-borders. The petunias, though perennial, are very often treated as annuals, sown on a hot-bed in spring, and planted out in summer, in which way they thrive even in northern countries. They are tall plants, with branching weak stems, and may readily be made to cover a trellis. Although, when treated as greenhouse plants, they become half-shrubby, they do not live more than two or three years.

PETUNSE, n., or PETUNTSE, or PETUNTZE, n. *pĕ-tŭns′:* fine white clay used by the Chinese with kaolin in their manufacture of porcelain: it is said to consist of comminuted but undecomposed felspar. It is fusible, and is used for glazing porcelain.

PETWORTH MAR′BLE, *pĕt′wėrth*, or SUSSEX MAR′BLE, *sŭs′ĕks* [named from its being found at Petworth, in Sussex, England]: thin layer of limestone, composed of the shells of fresh-water Paludinæ. It has been used long though not extensively for ornamental purposes. A polished slab of it was found in a Roman building at Chichester, England; and pillars formed of it stand in the cathedrals of Chichester and Canterbury.

PEUCE, n. *pūs*, or PEUCITES, n. plu. *pū′sīts* [Gr. *peukē*, the pine or fir]: generic name for all fossil wood which appears to have been cone-producing.

PEUTINGERIAN TA′BLE, *pū-tĭn-jē′rĭ-an:* interesting ancient document showing the military roads of the Roman empire, and indeed of the world known to the Romans. It is not, properly speaking, a map; no regard being paid to geographic position, or the extent of countries. The great lines of road are laid down in a narrow strip, as if nearly parallel, all proceeding from Rome as a centre; and as to rivers, it appears only whether they cross the road from left to right or from right to left of the traveller proceeding from Rome. The Mediterranean and other seas are represented by mere narrow channels. A small house is the mark for a town; important towns and military stations are distinguished by walls and towers. Rome, Constantinople, and Antioch are each represented by a circle, within which is a human figure seated; in the case of Rome, the figure is crowned. Until very recently, a portion of the only copy of this valuable relic of antiquity known to exist was evidently wanting, as it terminated abruptly on the w. at the confines of Spain, and included only the e. parts of Britain. In the e., it traces roads through India to a number of places of trade as far as the mouths of the Ganges. It is on parchment, and, as described in all the publications devoted to it, twenty-one ft. in length, and about 12 in. wide. It was found in the library of the Benedictine monastery at Tegernsee in Upper Bavaria, in the 15th c., by Conrad Celtes, who bequeathed it to Conrad Peutinger of Augsburg, a zealous antiquary, and one of the earliest authors on the Roman and other antiquities of Germany. Peutinger began to prepare a copy of it for publication, but died before he could accomplish his purpose, which, however, was partially executed by Mark Welser, in *Fragmenta Tabulæ Antiquæ ex Peutingerorium Bibliotheca* (Venice 1591). The anc. document itself remained in the hands of the Peutinger family, and attracted no further notice, till it was offered for sale 1714, and purchased by Prince Eugene, who presented it to the Imperial Library of Vienna, in which it remains. An

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exact copy was published at Vienna 1753, with introduction and index by F. C. von Scheyb. It was again published as an appendix to Katanesich's *Orbis Antiquus* (Ofen. 1825); and at the request of the Acad. of Munich, a revised ed., with introduction, was published by Conrad Mannert (Leip. 1824). Since that time, a leaf detached from the rest has been found in the Imperial Library at Vienna, but we are not aware that any particular account of it or its contents has yet been given to the public.

The P. T. does not always agree with the Antonine Itinerary (see ITINERARY); some stations and towns being marked in one which are not in the other, the distances marked also being sometimes different. But the two together throw great light on ancient geography. It appears almost certain from internal evidence that the P. T. belongs to the 3d or beginning of the 4th c. of the Christian era, though the existing copy seems to belong to a later date. The general character of the work seems to refer its authorship to times of prevalent paganism; while a few things appear, probably alterations of a copyist, which refer to Christianity.

PEW, n. *pū* [anc. *pue;* OF. *pui*, an elevated place—from L. *podĭŭm*, an elevated place, a balcony: Dut. *puyde* or *puye*, a pulpit or reading-desk: OE. *pues:* It. *poggia:* Sp. *poys*—anc., in general, 'anything on which to lean,' *s'appuyer*]: inclosed seat in a church or chapel: V. to fit or furnish with pews. PEW'ING, imp. PEWED, pp. *pūd.* PEW-OPENER, attendant in a church who opens the pew-doors for the seat-holders.—*Pews* in the sense of fixed church-seats were in use in England some time before the Reformation, as is proved by numerous examples extant, the carving on some of which is as early as the Decorated Period, i.e., before 1400; and records as old as 1450 speak of such seats by the name of *pues.* They were originally plain fixed benches, all facing east, with partitions of wainscoting about three ft. high, and sides of the width of the seat, panelled or carved; the sides sometimes rising above the wainscoting, and ending in finials or poppies, or else ranging with it and finished with a molding. After the Reformation—probably under the influence of the Puritans, who, objecting to some parts of the service which they were by law compelled to attend, sought means to conceal their nonconformity—pews grew into large and high inclosures, containing two or four seats, lined with baize, and fitted with doors, desks, and cushions. Pews were early assigned to particular owners, but at first only to the patrons of churches. A canon made at Exeter, 1287, rebukes quarrelling for a seat in church, and decrees that none shall claim a seat as his own except noblemen and the patrons. Gradually, however, the system of appropriation was extended to other inhabitants of the parish, to the injury of the poor, and the multiplication of disputes.

The law of pews in England is briefly this: All church-seats are at the disposal of the bishop, and may be as-

signed by him, either (1) directly by faculty to the holders of any property in the parish; or (2) through the church-wardens, whose duty it is, as officers under the bishop, to 'seat the parishioners according to their degree.' In the former case, the right descends with the property, if the faculty can be shown, or immemorial occupation be proved. In the latter, the right can at any time be recalled, and it lapses on the party ceasing to be a regular occupant of the seat. It appears that by common law every parishioner has a right to a seat in the church, and the church-wardens are bound to place each one as best they can. The practice of *letting* pews, except under the church-building acts, or special local acts of parliament, and, much more, the practice of *selling* them, has been declared illegal.

In Scotland, pews in the parish churches are assigned by the Heritors (q.v.) to the parishioners, who have accordingly the preferable claim on them; in towns the practice is to let them annually. As is well known, pews in dissenting churches are rented as a means of revenue to sustain general charges. In many parts of the United States, pews in churches are rented by annual competition, and bring very large sums: in many churches a different system prevails—that of private ownership. Latterly in the United States and in England, there has been discussion as to the injuriously exclusive character of the 'pew system;' and a disposition has been manifested in the United States to abolish the selling or renting of pews, and to declare them all free—raising funds for support of the church either by an endowment, or by annual voluntary contribution. In England, some have proposed to abolish pews altogether, and substitute movable seats available by all. In the Rom. Cath. churches on the European continent, pews are very rare.

PEWEE, or PEEWEE, *pē′wē*, or PHŒBE, *fē′bē;* sometimes PEWIT, or PEEWIT, *pē′wĭt*, or PUIT, *pū′ĭt:* names imitative of the notes of certain birds; and very confusedly applied. Pewee ends in vowels and is appropriate to the Wood Pewee (*Contopus virens*), with its soft prolongation of its second note. There is a Western Wood Pewee (var. *Richardsonii*), smaller, darker; Rocky Mts. to the Pacific. Peewit is more befitting the Phœbe-bird (*Sayiornis fusca*), with its shorter termination of note; it is unhappily sometimes called Water Pewee, when it nests on river-banks or under bridges. Others of this genus are Say's Pewit Fly-catcher, western (*S. sayi*), and the Black Pewit Fly-catcher (*S. nigricans*) of western rocky streams and cañons. The genus Contopus, among other differences, has the tarsus shorter than the middle toe and claw; Sayiornis not so. Both belong to the numerous groups of fly-catchers, and under the family Tyrannidæ. Unfortunately, the name peewit (also puit, puet) has been given to birds very unlike the fly-catchers, such as the peewit-gull or laughing-gull of Europe; also the lapwing, which is also called peweep, peaseweep, and piewipe.

PEWIT, n. *pē′wĭt*, or PE′WET: see PEEWIT.

PEWTER, n. *pū′tėr* [OF. *peutre;* Dut. *peauter;* It. *peltro*, pewter; Sp. *peltre*]: common and very useful alloy of the metals tin and lead. Two other kinds of pewter have a more compound character. Common, or *ley-pewter*, consists of 4 parts of tin and 1 part of lead; *plate-pewter* is made of 100 parts of tin, 8 parts of antimony, 2 parts each of bismuth and copper; another kind, called *trifle*, is composed of 83 parts of tin and 17 parts of antimony. Although these are the standard formulas, each kind is often varied to suit the purposes of the manufacturer; the chief alteration being the addition of a large proportion of lead to the last, and a large increase of the same metal in the other two. PEW′TERY, a. *-tėr-ĭ*, pertaining to pewter. PEW′TERER, n. *-tėr-ėr*, one who works in pewter. PEWTER-POT, a publican's measure for serving malt-liquors. *Note.*—Probably Eng. *spelter* is the original of *pewter;* and the It. *peltro* and others have been adopted from Eng. *spelter* by the loss of the initial *s*. *Zinc* or *spelter* and *pewter* are frequently confounded. See Skeat.

PEYER'S GLANDS, *pī′ėrz glănd̆z:* small glands beneath the villous coat of the intestines; they are most numerous in the lower portion of the ileum. When clustered together they are called *Peyer's patches;* when they occur singly they are called the *solitary* glands. They take their distinctive appellation from the name of Johann Konrad Peyer (1653–1712) of Schaffhausen, who discovered and described them.

PÉZÉNAS, *pā-zā-nâ′:* manufacturing town of France, dept. of Herault, on the left bank of the river Herault, 25 m. w.s.w. of Montpellier. It stands in a district remarkable for its beauty, and so well cultivated as to have received the name of the Garden of Herault. It is famous for its healthful climate and clear sky. The vicinity produces excellent wine, and woolen and linen goods are manufactured: the trade, however, is chiefly in liquors, and P. is known as one of the principal brandy-markets of Europe. Pop. 8,000.

PFAHLBAUTEN, n. *fâl-bow′tĕn* [Ger., meaning literally pile-dwellings—from *pfahl*, a stake or post; *bau*, a structure or edifice]: a term applied by the Swiss to the prehistoric lake-habitations of that country.

PFEFFERS, *pfĕf′fėrss:* extraordinary and much-visited locality in the canton of St. Gall, Switzerland, five m. s.e. of Sargans. It has been famous since the middle of the 11th c. for its hot baths, 2,180 ft. above sea-level, 520 ft. above the village of Ragatz. The old baths of P. are built on a ledge of rock a few ft. above the roaring torrent of the Tamina, and are hemmed in by walls of rock towering 600 ft., and so far burying the baths within the gorge, that, even in the height of summer, sunlight appears above them only from 10 A.M. to 4 P.M. Above the old baths, the walls of the ravine of the Tamina contract until they meet, covering up the river, which is

there seen from a cavernous gap. The hot springs are reached from the baths by means of a railed platform. This platform, leading to the hot spring, is secured to the rocks, and the Tamina churns its way through the cleft 30 or 40 ft. below. The waters of the hot spring are now conveyed to Ragatz (about two m. below P.) by wooden pipes, 12,500 ft. long. The waters, as they issue from the spring, have a temperature of 100° F. A pint of the water, which is used both for drinking and bathing, contains only about three grains of saline particles. Pop. (1880) 1,628.

PFEIFFER, *pfīffĕr*, IDA (REYER): notable traveller over 150,000 m. of sea and 20,000 m. of land: 1797, Oct. 14 —1858, Oct. 27; b. Vienna. From her earliest years she showed a resolute and fearless, though not unfeminine, disposition. In 1820 she married an advocate, named Pfeiffer, from whom she was obliged to obtain a separation, after she had borne him two sons, Oscar and Alfred, whose education devolved on herself. When she had settled them in life, and was free to act as she pleased, she proceeded to gratify, at the age of 45, her long-cherished inclination for a life of travel and adventure. Her first expedition was to the Holy Land. She left Vienna 1842, Mar., and returned in Dec., having traversed, alone and without guide, European and Asiatic Turkey, Palestine, and Egypt. She published an account of her eastern rambles in the following year (*Reise einer Wienerin in das Heilige Land*), which, like all her other works, has gone through many editions, and been translated into French and English. In 1845 she visited n. Europe—Sweden, Norway, Lapland, and Iceland—and recorded her impressions in *Reise nach dem Skandinavischen, Norden und der Insel Island* (2 vols. 1846). But these journeys, which would have satisfied most women, were but little excursions in the eyes of this insatiable nomade, and only served to whet her appetite for something vaster. She resolved on a voyage round the world; and 1846, June 28, sailed from Hamburg in a Danish brig for Brazil. Her descriptions of the scenery of that country and of the inhabitants—both native Indians and Brazilians—are exceedingly interesting. She then sailed round Cape Horn to Chili; thence, after some time, across the Pacific to Otaheite, China, and Calcutta; crossed the Indian peninsula to Bombay, whence she took ship for the Persian Gulf, landed at Bassora, traversed a great part of w. Asia, s. Russia, and Greece, and reentered Vienna 1848, Nov. 4. Two years later, she published a narrative of her travels and adventures, *Eine Frauenfahrt um die Welt* (Vienna 1850, 3 vols.). As a small recognition of her services, and of the singular energy, fortitude, and perseverance of her character, the Austrian govt. granted Madame P. a sum of $500. She now determined to go round the world again, but by a different route. Proceeding to England, she took ship 1851, May, for Sarawak, rounding the Cape of Good Hope, penetrated alone to the heart of Borneo, visited

Java and Sumatra, lived for a time with some cannibal tribes, and sailed from the Moluccas to California, thence to Peru, scaled the peaks of Chimborazo and Cotopaxi, made a tour through the principal of the United States, and returned to London 1854. This second voyage, signalized by several scientific observations, is described in *Meine zweite Weltreise* (Vien. 1856). But the more she travelled, the fiercer became her hunger for movement. 1856, Sep., she set out on what was to be her last expedition—namely, to Madagascar. After enduring terrible hardships, she came home to Vienna, where soon afterward she died.

PFORZHEIM, *pfōrts'hīm:* important manufacturing town of the grand-duchy of Baden, on the n. border of the Black Forest; on the Enz, at its confluence with the Nagold and Wurm, 55 m. s.s.e. of Mannheim, on a recently constructed branch of the Mannheim and Basel railway. Its trade has been greatly advanced by its position at the intersection of several minor lines of railway. P. contains the remains of an ancient castle, formerly the residence of the Markgrafs of Baden-Durlach; several churches, one of which, the *Schlosskirche*, on a height, contains a number of monuments, with marble statues of the princes of Baden; a convent for noble ladies; industrial and other schools; chemical and iron works; machine-shops, tanneries, and cloth and other factories. The principal articles of manufacture are gold and silver wares and trinkets, the chief markets for which are Germany and America. An important trade is carried on in timber, cut in the neighboring forests, and floated to Holland by the Neckar and Rhine. Pop. (1880) 24,037; (1890) 29,987; (1900) 43,351.

PHACOID, a. *făk'oyd* [Gr. *phakos*, a pea or lentil; *eidos*, appearance]: like a lentil.

PHACOPS, n. *făk'ŏps* [Gr. *phakos*, a lentil; *ōps*, the eye]: in *geol.*, a widely distributed genus of trilobites having large, faceted eyes.

PHÆDO, *fē'dō*, or PHÆDON, *fē'don:* philosopher: born in Greece, B.C. 4th c. While a youth he was captured by pirates and sold into slavery. He was brought to Athens, where he attracted the attention of Socrates, who procured his freedom and became his teacher. After the death of his instructor he founded the Eleatic system of philosophy. He was highly esteemed by Plato, who inscribed to him one of his celebrated dialogues.

PHÆDRA, *fē'drâ:* Greek legendary character, daughter of King Minos of Crete, and of Pasiphaë, and sister of Ariadne. She was wife of Theseus, and, according to the myth, became passionately in love with her step-son, Hippolytus, being inspired thereto by Venus, who was offended by his neglect of her worship. Being coldly received, P. made a false accusation against the young man to Theseus, who required of Neptune that he should be put to death. Accordingly Hippolytus was dragged

behind his chariot on the sea-shore till he died. P., suffering from remorse, committed suicide, and the father then learned that the son that he had caused to be murdered had not been at fault. This legend has appeared in various forms. Sophocles and Euripides made it the foundation of famous tragedies, and Racine used it with great effect in his drama *Phédre*.

PHÆDRUS, *fē′drŭs:* Latin poet, whose works consist of fables; whose life was during the reigns of Augustus, Tiberius, Caligula, and Claudius; b. on the Pierian Mountain, Macedonia; carried to Rome as a slave in his childhood, and brought up at the court of Augustus, who emancipated him. Under Tiberius, he was exposed to great danger from the hostility of Sejanus, but lived to see that general's overthrow, and died at an advanced age, probably in the reign of Claudius. Five books of fables, after the manner of Æsop, and called *Fabulæ Æsopiæ*, have been usually ascribed to him. The faults of the style have led, however, to the suspicion, not merely of alterations at a later date, but of later, even much later, composition. The dry 'morals' have been supposed to indicate the Middle Ages as the period to which the work should probably be referred; but its authenticity is generally admitted. The first edition was published at Troyes 1596. The text has subsequently occupied the attention of some of the greatest scholars and critics, from the days of Burmann and Bentley to the present time. Early in the 18th c., a MS. containing 32 new fables of P. was discovered at Parma (pub. 1808,11); superseded by a much better preserved MS. of the same, discovered in the Vatican, and pub. by Card. Mai 1831. The authenticity of these was at first doubted: it is now generally conceded. As their place in the five vols. of P. is not known, they are printed usually as an appendix, but not counted as a 6th vol. There were critical editions of P. by Bentley, Orelli (1832), Dressler (1838), and Müller (1877).

PHÆNOGAMOUS, a. *fē-nŏg′ă-mŭs* [Gr. *phaí′nō*, I show, I manifest; *gamos*, marriage]: in *bot.*, having conspicuous flowers: see PHANEROGAMIC (PHANEROGAMS).

PHÆOSPOREÆ, n. plu. *fē′ō-spō′rē-ē* [Gr. *phaí′os*, dusky; *spora*, seed]: in *bot.*, a division of Melanosporeæ, or olive-colored sea-weeds, which possess zoospores.

PHAËTHON, *phā′ē-thŏn* [Gr. the shining one]: in the writings of Homer and Hesiod, a frequent title of Helios the sun-god, and subsequently employed as his name (see APOLLO).—P., in Greek mythology, is the name also of a son of Helios and the ocean-nymph Clymene; famous for his unfortunate attempt to drive his father's chariot. Scarcely had the presumptuous youth seized the reins, when the horses, perceiving his weakness, ran off, and, approaching too near the Earth, set on fire the mountains, dried up rivers and seas, scorched Libya to a desert, and blackened the Ethiopians with the heat. Whereupon the Earth cried to Jupiter for help, and Ju-

piter struck down Phaëthon with a thunderbolt into the Eridanus or Po. His sisters, the Heliades, who has harnessed the horses of the Sun, were changed into poplars on the river's banks, and their tears into amber.

PHAETON, n. *fā'ĕ-tŏn* [*Phaëthon* (q.v.) in *anc. myth.*]: open chaise or carriage on four wheels, having sometimes a small seat behind.

PHA'ETON: in *ornith.*, same as PHAËTHON (see TROPIC-BIRD).

PHAGEDÆNA, n. *făg'ĕ-dē'nă* [Gr. *phagĕdai'na*, a cancer—from *phagein*, to eat]: spreading obstinate ulcer; gangrenous ulceration. PHAG'EDÆ'NIC, a. *-dē'nĭk*, rapidly destroying the parts attacked, as an ulcer.—*Phagedæna* designates a variety of ulceration in which there is much infiltration, with rapid destruction of the affected part. The sore presents an irregular outline and a yellowish surface; it gives off a profuse bloody or ichorish discharge, and is extremely painful. It usually attacks persons whose constitutions are vitiated by the syphilitic virus, by the abuse of mercury, by intemperance, etc.

A disease which in former times was not at all uncommon was what was known as Sloughing Phagedæna or Hospital Gangrene. This disorder occurred where there was overcrowding of sick and wounded men, and some idea of its virulence may be formed from the fact that, on the return of the French fleet from the Crimean war, no less than sixty deaths from it occurred in one ship in the course of thirty-eight hours. Since the principles of antisepsis and asepsis have guided surgical practice this affection has become practically extinct.

PHAGOCYTE, n. *făg'ō-sīt* [Gr. *phagō*, I eat; *kutos*, cell]: *Biol.:* a leucocyte or other living cell that takes into its substance and devours bacteria and other noxious matters. Phagocytes also devour the elements of organs peculiar to the larval stage, and later themselves become food for the developing organs of the adult. The phagocytes are of two classes: the free or wandering cells and the fixed cells. The free cells are certain of the leucocytes or white blood corpuscles. The fixed cells are those of the lining membrane of the blood-vessels and possibly certain connective-tissue cells.

It has been found that the phagocytes do not always devour the bacteria which have entered the body, but that these must be first acted upon by a substance present in the blood serum which renders them attractive to the devouring cells. This substance is called *opsonin* (q.v.). Upon its presence in sufficient quantity in the blood serum depends the question whether the organism will be able to overcome the infection or will be destroyed by it. When it is absent, or present in sufficient amount, the phagocytes are but feebly attracted toward the invading bacteria and do not destroy

them in such numbers as to prevent infection. In order to determine the presence or absence of opsonin a rather complicated technique is necessary. First a number of leucocytes are obtained from the blood by sedimentation and washing with a solution of salt to free them from the red blood cells and the serum. Then a number of bacteria are obtained suspended in a salt solution. Finally some serum, free from red and white cells, is obtained from the blood of the patient, and some more from the blood of a healthy person. We are now ready to make the test. This is done by making two mixtures; one of equal parts of leucocytes, bacteria, and blood serum from the patient; the other of equal parts of leucocytes, bacteria, and blood serum from a healthy person. These two mixtures are kept for a definite time at the normal temperature of the body, and then are examined under the microscope, and the number of bacteria ingested by a certain number of leucocytes in each specimen are counted. The difference in the number of bacteria contained in the leucocytes in the two specimens furnishes what is called the *opsonic index* and gives a measure of the amount of opsonin present in the patient's blood. If the opsonic index is low, i.e., if the patient's blood contains an insufficient amount of opsonin, an endeavor is made to increase this amount by the injection of a vaccine prepared from a culture of the bacteria used in testing the opsonic index. This method has been found useful in treating various infectious diseases, but it is as yet in the experimental stage and it is not possible at present to predict how far it will be found effective in treatment. PHAGOCYTIC, a. pertaining to phagocytes. PHAGOCYTISM, n. action or function of a phagocyte. PHAGOCYTOSIS, n. the ingestion of bacteria and other solid materials by the cells of the blood and tissues.

PHAIOPHYLL, n. *fī'ō-fĭl* [Gr. *phaios*, dusky; *phullon*, a leaf—from *phuō*, I produce]: a group of coloring matters in the leaves of plants, comprising various browns, soluble in water.

PHAKOSCOPE, n. *făk'ō-skōp* [Gr. *phakos*, lentil, lens, and *skopein*, view]: an instrument for showing the changes which take place in the convexity of the crystalline lens of the eye as it is accommodated for near and far vision. The apparatus is so arranged that the reflections of a candle flame by the cornea, by the anterior and by the posterior surfaces of the lens may be observed. The images reflected by the lens change in position as it becomes thicker, those from the anterior surface showing most alteration and thus indicating that accommodatory movements are chiefly due to changes in the convexity of this surface.

PHALACRO'CORAX. See CORMORANT.

PHALÆ'NA. See MOTH.

PHALANGER, n. *fa-lăn'jĕr*, or PHALANGIST, *fa-lăn'jĭst* [named from the formation of the hind-feet], (*Phalangista*): genus of marsupial quadrupeds, having a rather short head, short ears, short woolly fur, a long prehensile tail, sometimes completely covered with hair, and sometimes only at the base, and scaly toward the extremity; the dentition somewhat various as to the number of premolars, the incisors always six in the upper jaw and two in the lower, the true molars eight in each jaw, the canines of the lower jaw very small, and close to the incisors. The fore-paws are strong, and capable of much use in grasping food and bringing it to the mouth. A number of species inhabit Australia and the islands northward. They live chiefly in trees, and feed on insects, small animals of various kinds, eggs, and fruits. The SOOTY PHALANGER or TAPOA (*P. fuliginosa*) is common in Van Diemen's Land, and is much sought after for its fur, which is of uniform smoky-black color, or tinged with chestnut, warm and beautiful. The tail is very bushy. It is nocturnal in its habits.—The VULPINE PHALANGER (*P. vulpina*), called also VULPINE OPOSSUM, is very plentiful and widely diffused in Australia: length from point of muzzle to root of tail, about 26 inches; bushy tail about 15 inches long; color grayish-yellow on the upper parts, and tawny-buff below. The fur is not so much valued as that of the Vulpine Phalanger, but is used for various purposes. The flesh, though it has a strong peculiar flavor, is a favorite food of the Australian aborigines.—Nearly allied to this genus is the genus *Cuscus*, of which one species, whitish-gray, spotted with brown, is plentiful in the Molucca and Papuan Islands.

These animals are grouped in a family which is composed of several sub-families. In the family are included 10 or 12 genera and numerous species, among them the typical phalangers, the flying-phalangers and the flying-mouse. The flying phalangers are provided with a parachute-like expansion of the skin between the fore and hind limbs; by which they can make long skimming leaps from tree to tree as do the flying-squirrels of northern countries. The foremost genus is *Petaurus*, and the best known species is *P. breviceps*, which bears a remarkable resemblance to an American flying squirrel, but is somewhat larger. The flying-mouse is the minute *Acrobates pygmæus*, which is not more than six inches long, including the plume-like tail. The koala and wombat are also phalangers.

The Phalangers owe their name to the fact that the slender fourth and fifth toes of the hind feet are united in a common integument. The great toes are opposable, and are destitute of nails, the other digits being provided with curved nails. In confinement they are found to prefer flesh as an article of diet. They are eaten by the natives of the countries in which they occur, although the flesh is said to emit a strong and offensive odor.

PHALANGES, n. plu. *fă-lăn′jēz* [Gr. *phalangx*, a line of battle; *phalanggos*, of a line of battle]: the small bones of the fingers and toes, so named from their arrangement in rows; in *bot.*, bundles of stamens; stamens divided into lobes like a partite or compound leaf. PHALANGAL, a. *fă-lăng′găl*, or PHALANGEAL, a. *făl′ăn-jē′ăl*, of or relating to the small bones of the fingers and toes, which are arranged in rows, one before the other, in front of the wrist and ankle.

PHALANGIIDÆ, *făl-ăn-jī′ĭ-dē* [Gr. *phalanggion;* L. *phalangium*, kind of venomous spider]: family of trachearian Arachnida, popularly called *Harvest-men*, some of the species appearing in great numbers in fields during the hay and corn harvests. They resemble spiders in general form, though their organs of respiration are very different. Their legs are extremely long and slender. Most of the species are very agile. PHALANGID′EA, order of tracheate Arachnida. PHALAN′GIUM, typical genus of the family Phalangiidæ—known usually in the United States as *daddy-long-legs*. They are perfectly harmless.

PHALANGIOUS, a. *fă-lăn′jĭ-ŭs:* pertaining to a genus of spiders having very long legs, called Phalangium, *-jĭ-ŭm*, and also the harvest-man or harvest-bug.

PHALANSTERE, *făl′an-stēr*, or PHALANSTERY, *făl′ăn-stĕr-ĭ* [F. *phalanstère*—from *phalange* (phalanx) and *-stere;* word formed on the model of *monastère*, monastery]: building or group of buildings designed to house one of Fourier's *phalanges*, or socialistic organizations: see FOURIER, FRANÇOIS MARIE CHARLES. PHALANSTE′RIAN, a. pertaining to a phalanstere. PHALANSTE′RIANISM, or PHALAN′STERISM, n. organization of society into phalansteres; Fourier's system of social reform.

PHALANX, n. *făl′ăngks*, PHALAN′GES, PHAL′ANXES, n. plu. [Gr. *phalangx*, a line of battle]: ancient Greek formation for heavy infantry, which won for itself a reputation of invincibility. It may be described as a line of parallel columns, rendered by its depth and solidity capable of penetrating any line of troops. The oldest P. was the Lacedæmonian or Spartan, in which the soldiers stood eight deep; the Athenian P. had been the same, until, at the battle of Marathon (B.C. 480), Miltiades reduced the depth to four men in order to increase his front. When Epaminondas organized the Theban army against Sparta, he felt that the Spartan line of battle would be impregnable to troops organized in their own manner. He therefore increased the depth and lessened the front of his P., which enabled him to burst through the Spartan line, inflicting the sanguinary defeat of Leuctra, B.C. 371. Philip of Macedon had learned the art of war under Epaminondas, and when he resolved to make his state a military power, he formed the celebrated Macedonian P. (B.C. 359), which enabled him to conquer Greece, and with which his son Alexander subdued the eastern world. The Macedonian P., as the

latest form that organization assumed, and as the shape in which the P. encountered the military skill of the west, is worthy of description. The line was 16 deep: a grand-P., comprising 16,384 *hoplites*, or heavy-armed soldiers, sub-divided as follows: the grand-P. was composed of four phalanxes or divisions, each under a gen. officer, called a *phalangarch;* his command was divided into two brigades or *merarchies* (sometimes called *telarchies*), each of these comprising two regiments, or *chiliarchies*, of four battalions or *syntagmata* each. A *syntagma* corresponded accurately to a modern battalion, except that it was smaller. It was a perfect square, with 16 men each way; was commanded by a *syntagmatarch* or *xenagos;* and had an adjutant, with one or two other staff-officers who stood behind. Eight files united were under a *taxiarch;* four under a *tetrarch*, corresponding probably to a modern capt.; two files were under a *dilochite* or subaltern. A single file of 16 men was called a *lochos*, and the best man was placed at its head; a picked man, the *ouragos*, also marching in the rear. The arms of all these phalanx-men were pikes or spears, 24 ft. long, of which 6 ft. were behind and 18 ft. held in front of the combatant. As each man occupied with his shield 3 ft., the P., when it advanced, had six tiers of spear-points in front, a wall of steel which no troops could withstand, especially as the bearers of the spears were pressed on by the ten ranks in their rear. By rapid movements the P. could change front, form in close column of syntagmata, and execute other critical manœuvres.—The heavy-armed P. was ordinarily flanked by *peltastes* or light infantry, similarly formed, but only eight deep, while the cavalry were but four deep. The P., as representative of the heavy formation, came in contact with the lighter legion of Rome during the wars of Pyrrhus in Italy.—At the great battle of Heraclea (B.C. 279), the P. won the day; but the victory was attributable to other causes as much as to any superiority of formation.

Phalanx designates also the group of about 1,800 persons living together, in Fourier's plan of a reformed social order (see PHALANSTERE, etc.).

PHALARIS, n. *făl'a-rĭs* [Gr. *phal'āris;* L. *phalăris* or *phalēris*, the plant canary-grass]: a small genus of grasses, one of which, the canary-grass, is well known for its seeds, called *canary-seed;* the *Phalăris canārĭen'sis*, ord. *Gramin'eæ.*

PHALARIS, *făl'a-rĭs:* tyrant of Agrigentum in Sicily: about the middle of B.C. 6th c., prob. between B.C. 571 and 549. According to the prevalent tradition, he was infamous for cruelty. He maintained his power 16 years by the aid of foreign hirelings, and. it is said, by putting to death all persons of eminence in his dominions; but at last he fell a victim to popular indignation. He gratified, we are told, his love of cruelty by causing persons to be roasted alive in a brazen bull, which was made for

that purpose—the first victim being the maker, Perillus. Cicero calls him the 'most cruel of all tyrants' (*crudelissimus omnium tyrannorum*). Yet some doubt attaches to this view of his character, partly because many of the crimes laid to his charge are intrinsically improbable, partly because later traditions represent him as fond of literature and philosophy, and a patron of learned men. Lucian affirms that he was naturally a man of a mild and humane disposition. How far the later view should be allowed to modify the earlier, it is—in the absence of all reliable knowledge—impossible to say. It is under the later and milder aspect that P. is shown to us in the famous but spurious *Epistles of Phalaris*: see BENTLEY, RICHARD.—The theory has been advanced that P.'s cruelties were not so much personal as they were a phase of religious fanaticism—the customary human sacrifices of the ancient and horrid Baal-worship (see BAAL), which from Phœnicia had passed to Rhodes and prevailed there, which the Rhodians had brought to Gela when they founded it, and which thence passed to Agrigentum. Human sacrifices by fire to Baal were common in Carthage, in connection with an image of brass.

PHALAROPE, n. *făl'ăr-ōp* [Gr. *phalēros*, white, having a white spot—from *phalos*, shining; *pous* or *poda*, a foot], (*Phalaropus*): genus of birds of family *Lobipedidæ* (q.v.); having a rather long, slender, weak, straight bill, resembling that of the sandpipers, which, indeed, they otherwise much resemble, though differing in their aquatic habits; the greater part of their time being passed in swimming on the sea, where they seek mollusks and

Gray Phalarope (*P. lobatus*).

other small marine animals for their food. The GRAY P. (*P. lobatus*), though formerly so rare a bird in Britain that Pennant says he knew of only two instances of its occurrence in his time, is now frequently seen in its autumn migration from its northern abode to its southern winter quarters. It breeds in the arctic regions both of the old and the new world, migrating s. in both on

the approach of winter. Its entire length is rather more than eight inches. The tail is short. It is a beautiful bird, and remarkable for the great difference of its summer and winter plumage, the prevailing tint in winter being a delicate gray; in summer the upper parts exhibiting a fine mixture of black, white, and yellow, and the breast and under parts reddish-chestnut. Wilson's P. is the handsomest and the largest species: it is confined to America, breeding from the northern states northward, and migrating in winter to various parts of S. America.

The RED-NECKED P. (*P. hyperboreus*, or *Lobipes hyperboreus*, a generic distinction being made by Cuvier and others, on account of the sharper and more slender bill) breeds in some northern Scottish islands, though more frequently in more n. regions. It is rather smaller than the Gray P., graceful in form and movements, and finely colored. The phalaropes are very fearless of man, and easily tamed. Their flesh is oily and unpalatable.

PHALLUS, n. *făl'lŭs* [Gr. *phallos*, the male organ]: emblem of the generative power in nature, carried in solemn procession in the Bacchic orgies in anc. Greece. PHAL'LIC, a. *-lĭk*, pertaining to the *phallus*, or to the indecent rites connected with the orgies of Bacchus; pertaining to the worship of the generative principle.—The *Phallus*, a representation of the male generative organs, was an object of common worship throughout the nature-religion of the East, and was called by manifold names, e.g., Linga (q.v.), Yoni, Pollear, etc. Originally, it had no other meaning than the allegorical one of that mysterious union between the male and female, which throughout nature seems to be the sole condition of the continuation of the existence of animated beings; but at a later period, particularly when ancient Rome had become the hotbed of all natural and unnatural vices, its worship became an intolerable nuisance, and was put down by the senate on account of the more than usual immorality to which it gave rise. Its origin has given rise to much speculation, but no certainty has been reached by investigators. The Phœnicians traced its introduction into their worship to Adonis, the Egyptians to Osiris, the Phrygians to Attys, the Greeks to Dionysus. The common myth concerning it was the story of some god deprived of his powers of generation —an allusion to the sun, which in autumn loses its fructifying influence. The procession in which it was carried about was called Phallagogia, or Periphallia, and a certain hymn was sung on that occasion, called the Phallikon Melos. The bearers of the phallus, which generally consisted of red leather, and was attached to an enormous pole, were the Phallophoroi. Phalli were on those occasions worn as ornaments round the neck, or attached to the body. Aristotle traces the origin of comedy to the ribaldry and the improvised jokes customary on those festivals. Phalli were often attached to statues, and of a prodigious size; sometimes they were even movable. At a procession of Ptolemy Philadel-

phus, a phallus was carried about made of gold, and 120 yards long. Before the temple of Venus at Hierapolis there stood two phalli, 180 ft. high, upon which a priest mounted annually, and remained there in prayer for seven days. The phallus was an attribute of Pan, Priapus, and to a certain extent also of Hermes.

PHAL'LUS: genus of fungi of the division *Gasteromycetes*, egg-shaped, the outer covering at length bursting to permit the growth of a stem, the receptacle which produces the spores, and which is surmounted by a rudimentary *pileus*. A common species, *P. impudicus* or *fœtidus*, popularly called *Stinkhorn*, is as large as a hen's egg, growing underground in thickets, and finally sending up a stem 4–6 inches high, the fetid smell of which is noticeable for many yards around. The egg is full of a jelly-like substance. The growth of the stem is very rapid, and it soon decays.

PHANERITE SERIES, *făn'ĕr-īt* [Gr. *phan'ĕros*, evident, visible—from *phainō*, I show]: in *geol.*, a term sometimes employed to designate the uppermost stage of the earth's crust, consisting of deposits produced by causes in obvious operation.

PHANEROGAMIC, a. *făn'ĕr-ō-găm'ĭk*, or PHAN'EROGA'MIAN, a. *-gā'mĭ-ăn*, or PHAN'EROG'AMOUS, a. *-ŏg'ă-mŭs* [Gr. *phanĕros*, manifest; *gamos*, marriage]: in *bot.*, applied to plants having conspicuous flowers containing stamens and pistils—opposed to *cryptogamic*. PHANEROGAMS, n. plu. *făn-ĕr'ō-gămz*, or PHANEROGAMOUS PLANTS, plants which have true flowers, and in which the sexual organs (stamens and pistils) are distinctly notable. They are called also FLOWERING PLANTS (see also PHÆNOGAMOUS), being by all these names distinguished from Cryptogamous Plants (q.v.). The seeds originate from Ovules (q.v.), and already contain the young plant, more or less perfectly formed, called the *embryo*. Phanerogams number about three-fourths of all known plants. Among them are included all the larger plants, and all plants of great importance in an economic view. They are generally divided into *Monocotyledonous* or *Endogenous Plants*, and *Dicotyledonous* or *Exogenous Plants*.

PHANTASCOPE, n. *făn'tă-skōp* [Gr. *phantas'ma*, an image—from *phainō*, I show; *skopĕō*, I view]: an optical instrument enabling persons to look cross-eyed, thus giving an appearance of motion to figures for the purpose.

PHANTASIASTS, n. plu. *făn-tăz'ĭ-ăsts* [Gr. *phantasiazō*, I cheat with vain appearances]: in *chh. hist.*, a division of the Monophysite sect in the 6th c., followers of Julian of Halicarnassus in believing that the Divine nature had so insinuated itself into the body of Christ from the very moment of his conception that it became incorruptible, and did not feel real hunger, thirst, fatigue, or pain, but only semblances thereof. The P. were called also Aphthartodocetæ, Docetæ, and Manicheans: see MANICHEAN.

PHANTASM, n. *făn'tăzm*, or PHANTASMA, n. *făn-tăs'mă* [Gr. *phantas'ma*, an image]: something that appears only to the imagination or to the mind; a vision; a spectre. PHANTAS'MAL, a. *-măl*, pertaining to.

PHANTASMAGORIA, n. *făn-tăs'mă-gō'rĭ-ă* [Gr. *phantasma*, an image, a spectre; *agŏra*, a meeting or collection of people—from *ageirō*, I collect]: a magic-lantern with slides, by which figures are largely magnified on a wall or screen, and made to appear as if in motion. PHANTAS'MAGO'RIAL, a. *-gō'rĭ-ăl*, pertaining to. PHANTAS'MATOG'RAPHY, n. *-tŏg'ră-fĭ* [Gr. *graphō*, I describe]: a description of celestial appearances, such as rainbows, halos, and the like.

PHANTASTIC and PHANTASY: see FANTASTIC and FANTASY.

PHANTOM, n. *făn'tŏm* [Gr. *phantasma*, an image: It. *fantasima:* F. *fantôme*, OF. *fantosme*, a spirit, a ghost: same as PHANTASM, which see: Gr. *phainein*, to show—from *phaein*, to shine]: that which has only an apparent existence; a spectre; a fancied vision; a spirit.

PHANTOMNATION, *făn-tom-nā'shŭn* [derived from a printer's error uniting two words in a line of Pope, 'the phantom nations of the dead': the word does not really exist]: term which was inserted in an English dictionary, as a title-word with a definition, and credited to Pope. This misapprehension was ludicrous enough; but the word became an amusing and surprising illustration of the self-perpetuating power of a linguistic mistake. Thus in the *Imperial Dictionary* (Blackie and Son, London; The Century Co., New York; 1883), in the *Encyclopœdic Dictionary* (Cassell and Co., London 1886), in *Webster's Unabridged Dictionary* (1880), and in other works of the highest standing, P. appears—defined as 'an illusion,' etc., its use credited to Pope; and marked as 'obsolete' or 'rare.'

PHARAOH, *fā'rō* or *fā'rā-ō:* official title of the Egyptian kings; given by the Hebrews as a proper name to the monarch ruling in Egypt at the time, as Cæsar was applied to the Roman emperors, and as Khan is to the Tartar, and Shah to the Persian, rulers. The word is of uncertain etymology, being capable of two derivations—viz., either *Pa ra*, 'the Sun,' the leading or first title of all Egyptian monarchs; or the popular expression, *Pi ouro*, or *Phouro*, 'the King.' It is even possible also to derive it from *Pa har*, 'the Horus,' another title of Egyptian monarchs. Great difficulties have been encountered in attempting to determine the particular monarchs who pass under this name in the Scriptures. The first-mentioned P. is the one in whose reign Abraham visited Egypt, who is supposed by some chronologists to have been one of the Shepherd Monarchs; but nothing beyond mere conjecture supports this theory. Another P. is the one in whose reign Joseph was brought to Egypt, and who was supposed by Eusebius to be Apophis, one of the later Shepherd Kings of the 17th dynasty, who

are known from the monuments to have immediately preceded the 18th. Bunsen indeed places the arrival of Joseph in the reign of Usertesen, or, as he reads his name, Sesertesen I. of the 12th dynasty, in which indeed a famine is stated in the hieroglyphical texts to have occurred, and in which it appears numerous officers were established to take charge of the grain. Arguments may be adduced for Joseph's arrival in the time of the 12th dynasty, from the fact of the establishment of the family of Jacob in the land of Goshen, the importance to which Joseph had risen, and the omission of the name of any of the principal Egyptian cities in the narrative, and the fact of Joseph having married Asenath, daughter of Potipherah, priest of Heliopolis, a city evidently the seat of the court under the 12th dynasty, as Ouar or Avaris was under the Shepherds. Equal difficulty has been experienced in determining the P. who reduced the Israelites to bondage, employed them in the labors of the brick-field, and compelled them to build the treasure-cities of Pithom and Rameses. This P. appears to have meditated the total absorption of the Hebrews into the Egyptian race. All that is clear from the narrative is that the city of Rameses was called after his name, in the same manner as modern forts have been by contemporary rulers. Now, frequent mention occurs in the Papyri and other texts of the *Makatalu en Ramessu* or Tower of Rameses II. (Rameses the Great) which is represented on the walls of Medinat-Abu; and this has induced Lepsius and Bunsen to depress the date of the Exodus from B.C. 1491 to the close of the 19th dynasty, or after Rameses II.—a point controverted by other chronologists, who wish to elevate it to the middle of the 18th dynasty, or B.C. 1732. To synchronize the former date, Lepsius takes the rabbinical date of B.C. 1314 for the Exodus, or B.C. 1340 for the birth of Moses. The P. of the Exodus is supposed to be Merienptah or Menephthes, son and successor of Rameses II. Philologically, this explanation is preferable, as the fixed point in the inquiry is the name of the Migdol of Rameses found both in the Scriptures and on the monuments of Egypt: the most recent investigations favor this solution of the question: see EGYPT: MOSES. Other Pharaohs are mentioned in history—e.g., the father of Tahpenes, who was wife of Hadad and mother of Genuboth; the P. whose daughter Solomon married; P. Nechao, or Necho II., who gave battle to Josiah, King of Judah, whom he slew at Megiddo, who also made war against the Syrians, defeated them at Magdolus, and took Cadytus or *Katsh*, on the *Arunata* or Orontes. He was subsequently defeated by Nebuchadnezzar at Carchemish B.C. 607. P. Hophra was the Uaphris or Apries of the Greeks, whose destruction was prophesied by Jeremiah, and who was strangled B.C. 570.—Bunsen, *Ægyptens Stelle;* Lepsius; Nash, *The P. of the Exodus* (1852); Maspero; Brugsch; and the works named under EGYPT.

PHARAONIC, a. *fā'rā-ŏn-ĭk:* pertaining to the *Pharaohs* or to the anc. Egyptians.

PHARISEE, n. *făr'ĭ-sē* [Gr. *pharĭsaï'os,* a Pharisee—from Heb. *párash,* to separate]: member of a party prominent among the Jewish people at the time of Christ, strict observers of the letter of the law, and of the traditions of the Elders. PHAR'ISA'IC, a. *-sā'ĭk,* or PHAR'ISA'ICAL, a. *-sā'ĭ-kăl,* pertaining to the Pharisees; ritual; externally religious. PHAR'ISA'ICALLY, ad. *-lĭ.* PHAR'ISA'ICALNESS, n. *-nĕs,* the state of being pharisaic. PHAR'ISA'ISM, n. *-ĭzm,* the doctrines or practices of the Pharisees; the rigid observance of the external rites and forms of religion without genuine piety; obedience in letter and not in spirit; hypocrisy in religion; 'obedience petrified into formalism, religion degraded into ritual, and morals cankered by casuistry.'

PHARISEES, *făr'ĭ-sēz* (*Perishin* or *Perushim,* Separatists): so-called Jewish sect, more correctly a Jewish school, which probably dates as a distinct body or party from the time of the Syrian troubles, and whose chief tendency was to resist all foreign, chiefly Greek, influences that threatened to undermine the sacred religion of their fathers. They emphatically took their stand on the Law, together with those inferences from its written letter which had, partly from time immemorial, been current as a sacred tradition among the people. Out of the small band of the Chasidim (q.v.), the Pharisees had taken their rise originally as *Chaberim,* Friends, Colleagues, Scholars—in contradistinction to the *Am-Haarez,* or common people—and their chief object in life was the study and further development of the Divine Law. Principally distinguished by their most scrupulous observances of certain ordinances relating to things clean and unclean, they further adopted among themselves various degrees of purity, the highest of which, however, was scarcely ever reached by any member of their community. For every degree, a special course of instruction, a solemn initiation, and a novitiate was necessary; all of which, together with a certain distinction in dress, seems to have been imitated from them by the Essenes (q.v.). The name of Pharisee or Perushim was probably bestowed on them at first in derision by the Sadducees or Zadokites—the priestly aristocracy and their party, the Patricians, who differed from them politically and to some extent in religious matters. The Pharisees had no special 'Confession of Faith,' or articles of creed different from the whole body of Jews. The Bible, as interpreted by the traditional Law, was their only code. Obedience to this Law, strictest observance of all religious and moral duties, submission to the Divine will, full confidence in the wisdom and justice of Providence, firm belief in future reward and punishment, chastity, meekness, and forbearance—these were the doctrines

inculcated in their schools. They were, in fact, nothing more or less than the educated part of the people, who saw in rigid adherence to the ancient religion, as it had developed itself in the course of centuries, the only means of saving and preserving the commonwealth, notwithstanding all its internal and external troubles. Hence, they wished the public affairs, the state and all its political doings, to be directed and measured by the standard of this same Divine Law; without any regard for those aristocratic families who ruled, or at least greatly influenced, the commonwealth. These consisted of the priestly families, the Zadokites (Sadducees, q.v.), and of the valiant heroes and sagacious statesmen who had brought the Syrian wars to a successful issue, and had, by prudent negotiations with other courts, restored the nation to its former greatness, and, on their own part, had acquired wealth and fame, and freer and wider views of life and religion. The Sadducees held the modern doctrine, that religion and state were two totally different things; that God had given man the power of taking his matters into his own hands; and that it was foolish to wait for a supernatural interference, where energy and will were all that was required. Naturally, the political difference between the two parties by degrees grew into a religious difference; since the Jewish state was one still completely pervaded by the religious element—as indeed it had begun as a theocracy, and could still to a certain extent be called by that name. And the more the Sadducees lost their influence —the people siding with the P.—the more the religious gulf must have widened between them; though the divergence between them, as far as our authorities—Josephus, the New Testament, and the Talmud—go, does not seem to have been very grave. Thus, the P. assumed the dogma of immortality, chiefly with a view to a future reward of good and evil deeds in this world; while the Sadducees, without denying—as we are erroneously informed by Josephus—this dogma, yet held that there was nothing in the Scriptures to warrant it, and, above all, that there was no need of any future reward; at any rate, that a pious life with a view to future reward was not meritorious. This position of the Sadducees seems analogous to that of the agnostics of the present day—depriving the doctrine of immortality of all practical influence on conduct and character. While the P. held all the traditional ordinances in equal reverence with the Mosaic ones, tracing, in fact, most of the former to Sinai itself, the Sadducees rejected, or rather varied, some of these according to the traditions of their own families: these ordinances relating chiefly to priestly and sacrificial observances, certain laws of purity, and some parts of the civil law. It may perhaps even be assumed, with some recent investigators (chiefly Geiger), that the P. were representatives of a newer Halacha, dictated by an oppositional and religious and national zeal which carried them far beyond the original

boundaries. Certain other legal differences between the two parties, such as the application of the laws of inheritance to daughters, or of the responsibility of the master for his servants, are nothing more than political party-views in a religious mask, which were meant to meet certain special isolated cases only. In general, the P. handled justice in a much milder manner than their antagonists, who took their stand upon the rigid letter, and would hear of no mercy where a violation of the code was clearly made out. Out of the midst of the P. rose the great doctors and masters of the Law (*Soferim*, Scribes; *Nomodidaskaloi*, teachers of the Law), and to them were intrusted by the later rulers the most important offices.

Until recently, great misconception has prevailed even among scholars respecting this patriotic, pious (in the legal sense), learned, and national party of progress. That there were among them those who were a disgrace to any party, and, still more, to their strict one, no one knew better than the P. themselves; and in bitterer words than were ever used by Christ and the apostles, the Talmud castigates certain hyperpious members of their own community as the 'plague of Pharisaism.' These hypocrites were characteristically styled *Zebuim* [dyed, painted ones], 'who do evil deeds like Zimri, and require a godly reward like Phinehas.' Seven kinds of P. are enumerated in the Talmud, six of whom were not to be counted as real Pharisees—viz., (1) they who did the will of God for earthly motives; (2) those who made very small steps, or said: Wait for me—I have still some good deed to do; (3) those who knocked their heads against walls, lest they might look at a woman; (4) *ex-officio* Saints; (5) those who say: Tell me of another duty; (6) those who are pious, because they *fear* God. The only genuine Pharisee was he 'who did the will of his Father in Heaven, because he loved Him.' Josephus's accounts, distortions in themselves, have, to add to the confusion, been misunderstood (thus, e.g., the word which he uses to designate the three parties, Pharisees, Sadducees, Essenes, never meant 'sect,' as it has commonly been interpreted); and the position of Christ, in relation to the P., can never be understood properly without a full acquaintance with the circumstances of the time, to which there is no other way than a knowledge of that literature (the Talmud and Midrash), so long neglected. Christ found the influence of the P. predominant among the people, though the Sadducees were in reality the ruling class and allies of the reigning dynasty. He naturally sided with the democratic party of the P. against that of the proud opposite camp. As for the religious tendencies of the latter—the Sadducees (q.v.)—the people had decided that point already practically, by siding with the Pharisees. Once only an allusion is made also to the leaven of Herod = the Sadducees (Mk. viii. 15, comp. Matt. xvi. 6). But it was, above all things, necessary to combat the ever-growing

tendency to choke all real piety and genuine virtue of heart under external ceremonies and observances, which, unless guarded against, will appear, instead of a mere symbol and memento, the essence of religion itself, and thus become in time a delusion and bondage, ending in that vile hypocrisy against which the Talmud fights with all its powers of derision, and Christ inveighs in much more vehement terms than is his wont. It was not in themselves that these 'oral laws' were held up to scorn. They were a necessary and natural growth, and acted, in the main, beneficially; as is now fully recognized by scholars of eminence. (For some further remarks on the subject, see TALMUD.)

The Pharisees represented the great body of the people at the era of the Second Temple; they instituted synagogues and schools providing for the continuance of their religion. They were a party of progress far removed from the attitude usually assigned them in polemics. They breathed cheerfulness and domestic joy into Sabbath and pastoral; forming an aristocracy of learning and not of blood as boasted by the Sadducees. They shaped the character of Judaism for the future and far from being narrow hypocrites their very legalism and separatism were forces that preserved the Jew in the deluge of barbarism and disintegration which marked many centuries after the fall of Jerusalem. Consult J. Cohen, *The Pharisees* (Paris); J. Elbogen, *Die Religiousanschauung der Pharisæë* (Berlin, 1904); Schurer, *Gesch.* (3d ed., pp. 380–419). See JEWISH SECTS; SADDUCEES.

PHARMACEUTICAL, a. *fâr'mă-sū'tĭ-kăl*, or PHAR'MACEU'TIC, a. *-sū'tĭk* [Gr. *pharmakei'ă*, the using of medicine; *phar'măkon*, a drug]: of or relating to pharmacy, or to the art of preparing medicines. PHAR'MACEU'TICALLY, ad. *-lĭ* PHAR'MACEU'TICS, n. plu. *-tĭks*, the science of pharmacy, or of preparing medicines. PHAR'MACEU'TIST, n. *-tĭst*, one who practices pharmacy or prepares medicines; an apothecary.

PHARMACIEN, n. *fâr-măs'ĭ-ăng* [F.]: a duly qualified pharmaceutist.

PHARMACOGNOSIS, n. *fâr'mă-kŏg-nō'sĭs*, or PHAR'MACOG'NOSY, n. *-kŏg'nō-sĭ* [Gr. *phar'măkon*, a drug; *gnōnis*, knowledge—from *gignōskō*, I know]: the knowledge of drugs or medicines, their properties and operations; the branch of materia medica which treats of simples, or unprepared medicines.

PHARMACOLITE, n. *fâr-măk'ō-līt* [Gr. *phar'măkon*, a drug or poison; *lithos*, a stone]: a mineral occurring in delicate silky fibres of a white or grayish color—a native arseniate of lime.

PHARMACOLOGY, n. *fâr'mă-kŏl'ŏ-jĭ* [Gr. *phar'măkon*, a drug; *logos*, discourse]: a treatise on the history, proper uses, and composition of drugs; materia medica.

PHAR'MACOL'OGIST, n. *-jĭst*, a writer on the nature and uses of drugs, or skilled in their use. PHARMACOPOLIST, n. *-kŏp'ŏ-lĭst* [Gr. *pōlĕō*, I sell]: druggist.

PHARMACOPŒIA, n. *fâr'mă-kō-pē'ă* [Gr. *phar'-makon*, a medicine or drug; *poiĕō*, I make]: book of authorized directions for selection and preparation of substances to be used as medicines, including a list of the articles of the Materia Medica (q.v.), with their characters and tests. Almost every civilized country of importance has its own pharmacopœia. The first official pharmacopœia was published in Florence in 1498. The next work of the kind published under government authority appears to have been that of Nuremberg, 1546: it was compiled by Valerius Cordus, a student of medicine, and consisted of selections of medical receipts from the works of the most eminent writers on medicine. Before this time, the books chiefly in use among apothecaries were the treatises on simples by Avicenna and Serapion, the *De Synonymis* and the *Quid pro Quo* of Simon Januensis, the *Liber Servitoris* of Bulchasim Ben-Aberazerim, and the *Antidotarium* of Nicolaus de Salerno: an abridgment of this work was known as *Nicolaus Parvus*, the work itself as *Nicolaus Magnus*.

In England a pharmacopœia was issued first by the College of Physicians 1618—the *London Pharmacopœia;* it was selected mostly from the works named above. For 100 years the *London Pharmacopœia* remained essentially unchanged, retaining the heterogeneous mixtures of mediæval pharmacists, some of them having 20–124 ingredients, and a list of simples embracing such medicaments as earthworms, crabs' eyes, dung, blind puppies, human skulls, etc.: many of these substances figured in the *London Pharmacopœia* till 1746. The first *Edinburgh Pharmacopœia* was published 1699, and the first *Dublin Pharmacopœia* 1807.

The first *Pharmacopœia of the United States* was published for the use of the Continental Army in 1778. The Massachusetts Medical Society published a pharmacopœia in 1808, and the New York Hospital one in 1816. Dr. Lyman Spalding submitted, 1817, to the Med. Soc. of the Co. of N. Y. a project for forming a national pharmacopœia. Delegates from all med. societies and med. schools in the e., middle, w., and s. states were to convene and provide for compilation of a pharmacopœia in each section. In a general convention to be held at Washington, these 4 compilations were to be referred to a competent commission which was to reduce them to the form of a general pharmacopœia. The e. and middle states submitted each a draft of a pharmacopœia to the convention at Washington 1820, and the results of their labors appeared in the *Pharmacopœia of the United States*, published at Boston that year, Dec. 15. It was written both in Latin and English. Thereafter a revision of the pharmacopœia has been made decennially

by authority of conventions of medical societies and schools, schools of pharmacy, associations of pharmacists, and representatives of the medical departments of the army and navy. The 6th revision was published 1883. The convention to provide for the 8th revision was held in Washington 1900.

The *Pharmacopœia of the United States* has the titles of the articles arranged under the officinal (Latin) name of each medicinal substance or compound; then follows the English name; and in many cases another English name succeeds, e.g., *Liquor Potassii Arsenitis:* Solution of Arsenite of Potassium: Fowler's Solution. Then is added the method of preparing the medicament. In the 8th revision, published in 1905, the doses of the several preparations are given.

The French Pharmacopœia, or *Codex,* is largely in use in Central and S. America, and it is official in Turkey. The first national pharmacopœia in Italy was published in 1892. Besides the countries named above, the following have national pharmacopœias: Austria, Belgium, Denmark, Germany, Greece, Holland, Hungary, India, Mexico, Norway, Portugal, Russia, Spain, Sweden.—Pharmacopœias of homeopathy also are published. What is now to be hoped for is a universal pharmacopœia, so that the most important medicines of the American, British, and chief continental European pharmacopœias shall be of the same strength.

PHARMACOSIDERITE, n. *fâr'mă-kō-sĭd'ėr-īt* [Gr. *phar'măkon,* drug; *sidērŏs,* iron]: a mineral of various shades of green, inclining to yellow and brown; arseniate of iron.

PHARMACY, n. *fâr'mă-sĭ* [Gr. *phar'măkon,* a medicine or drug: OF. *farmacie,* F. *pharmacie,* pharmacy]: department of *Materia Medica* (q.v.) which treats of the collection, preparation, preservation, and dispensing of medicines: it is synonymous with *Pharmaceutical Chemistry.* It denotes the occupation of a druggist.

Pharmacy touches the medical art on the one hand and chemistry on the other; and the pharmacist needs to be master of the systematic description of articles of the Materia Medica (q.v.), their sources, physical and chemical properties, preparation, compounding, etc., and at the same time to have an acquaintance with the physiological action and the therapeutic and toxic action of drugs. Instruction in pharmacy comprises several branches: 1. Materia medica and botany; these branches are taught by object-lessons, the pupil following the lectures with specimens before him of plants, crystals, and other objects constituting the subject-matter. 2. Analytical chemistry, which should be taught by way of actual laboratory work. 3. Practical compounding of medicines. 4. Pharmaceutical assaying, or organic chemical analysis.

PHARNACES, *fâr'na-sēz:* king of Pontus, son of

Mithridates the Great. He usurped the throne of his father, who was compelled to commit suicide, 63 B.C., and by friendly embassies to Pompey enjoyed for a time the friendship of Rome. The civil war between Cæsar and Pompey tempted him to make an effort to extend his territory, thereby bringing on a war with Rome. Cæsar himself met him near Zela (47 B.C.), utterly routed his armies, and sent to Rome the famous message, 'Veni, vidi, vici.' Reports conflict concerning the fate of Pharnaces, some accounts having him slain in battle, while others make him die in captivity.

PHAROS, n. *fā'rŏs* [*Pharos* or *Raudhat-el-tin*—i.e., fig-garden—an island in the Bay of Alexandria, on which King Ptolemy Philadelphus built a famous light-house known by the same name]: a light-house for the direction of seamen; a beacon.

PHAROS, *fā'rŏs* or *fâ'rŏs:* rocky islet off the coast of Egypt, which Alexander the Great connected with Alexandria by the Heptastadium, or Seven-Furlong Mole. The light-house, at its n.e. point, begun by Ptolemy I. and finished about B.C. 280, was one of the wonders of the ancient world. It seems to have been 400 ft. high, and stood 1,600 years. The fire, constantly kept lighted on its summit, was said to be visible 40 m. The island of Pharos became ultimately a suburb of Alexandria by means of a street extending along the mole. After the time of Julius Cæsar, it relapsed into a mere fishing station.—From the ancient Pharos, any light-house is sometimes so called.

PHARSALUS, *fär-sā'lŭs,* now FERSALA: town of Thessaly, s. of Larissa, on a branch of the Salambria, accordingly in the part of Thessaly restored to Greece 1881. It is historically notable mainly for the great battle here between Cæsar and Pompey, B.C. 48, Aug. 9. Pompey had about 45,000 legionaries, 7,000 cavalry, and a great number of light-armed auxiliaries. Cæsar had 22,000 legionaries and 1,000 German and Gallic cavalry. The battle, which began with an attack on Pompey's left wing, ended in a complete victory for Cæsar, and determined the fate of the Roman world.

PHARYNGEAL, a. *făr'ĭn-jē'ăl* [Gr. *phar'ungx* or *pharung'ga,* the gullet or windpipe: F. *pharynx:* It. *faringe,* the pharynx]: pertaining to or connected with the pharynx. PHARYNGITIS, n. *făr'ĭn-jī'tĭs,* inflammation of the pharynx. PHARYNGOBRANCHII, n. plu. *făr-ĭng'gō-brang'kĭ-ī* [Gr. *brangchia,* gills]: sub-order of Dermopterous Fishes (q.v.), characterized by respiratory processes projecting from above the pharynx into the large cavity of the mouth. The pharyngobranchii have no heart, and are lowest in organization of all fishes. The species are very few. See LANCELET. PHARYNGONATHI, *făr-ĭng-gŏg'nā-thī* [*gnathos,* the jaw]: order of fishes, in the system of Müller and Owen; partly *Acanthopterous*

and partly *Malacopterous* in the system of Cuvier; some of them also *Cycloid,* and some *Ctenoid.* Their common characteristic is the union of the lower pharyngeals into one bone. PHAR'YNGOT'OMY, n. *-gŏt'ŏ-mĭ* [Gr. *temnō,* I cut]: the operation of making an incision in the pharynx to remove an obstruction or a tumor.

PHARYNX, n. *făr'ĭngks:* that part of the alimentary canal which lies behind the nose, mouth, and larynx. It is a musculo-membranous sac, forming the back part of the mouth; situated on the cervical portion of the vertebral column, and extending from the base of the skull to the level of the fifth cervical vertebra, where it becomes continuous with the Œsophagus (q.v.). Its length is about four inches and a half, it is broader in its transverse than in its antero-posterior diameter, and its narrowest point is at its termination in the œsophagus. Seven *foramina* or openings communicate with

Fig. 1.—The Pharynx laid open from behind:

1, a section of the base of the skull; 2, 2, the walls of the pharynx drawn to either side; 3. 3, the posterior nares, separated by the vomer; 4, 4, the extremities of the Eustachian tube; 5, the soft palate; 6, 6, 7, 7, its posterior and anterior pillars; 8, the root of the tongue; 9, the epiglottis overhanging; 10, the opening of the larynx; 11, the posterior part of the larynx; 12, the opening into the œsophagus, whose external surface is seen at 13; 14, the trachea.—(From Wilson.)

it—viz., the two *posterior nares* or nostrils, at the upper and front part of the pharynx; the two *Eustachian tubes,* opening on the outer surface of the preceding orifices; the *mouth;* the *larynx;* and the *œsophagus.*

The pharynx is composed of an external *muscular* coat; a middle *fibrous* coat called the *pharyngeal aponeurosis,* thick above where the muscular coat is absent, and gradually thinning as it descends; and a *mucous* coat, continuous with the mucous membrane of the mouth and nostrils. The muscular coat is composed

of a *superior, middle,* and *inferior constrictor* muscle on either side, with two less important muscles, the *stylo-pharyngeal* and *palato-pharyngeal* muscles. When the food, after being sufficiently masticated and mixed with the saliva, is thrown by the action of the tongue, into the pharynx, the latter is drawn upward and dilated in different directions; the elevator muscles (the stylo-pharyngeal and palato-pharyngeal) then relax, and the pharynx descends; and as soon as the morsel is fairly within the sphere of action of the constrictor muscles, they successively contract upon it, and gradually pass it onward to the œsophagus. Independently

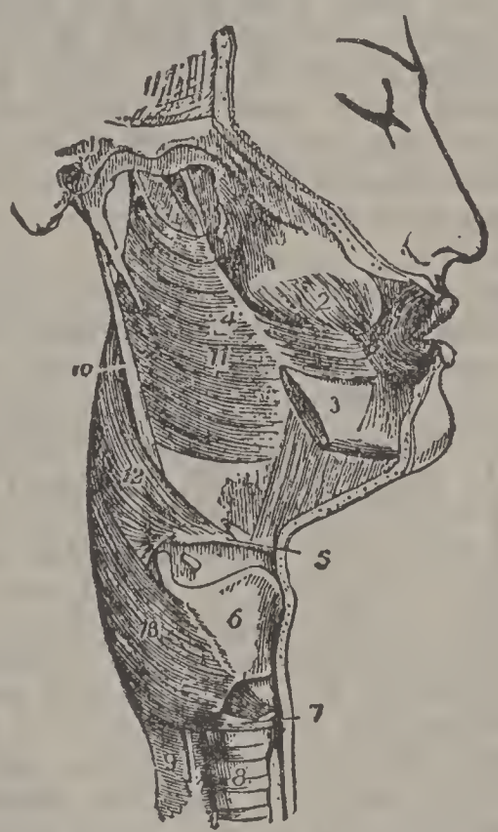


Fig. 2.—External View of the Muscles of Pharynx:

1, the orbicularis oris muscle; 2, the Buccinator muscle; 3, portion of lower jaw, part of which is cut away; 4, pterygomaxillary ligament; 5, the hyoid bone; 6, the thyroid cartilage; 7, the bicoid cartilage; 8, the trachea; 9, the œsophagus, with the recurrent laryngeal nerve lying between it and the trachea; 10, the stylo-pharyngeal muscle; 11, 12, 13, the superior, middle, and inferior constrictor muscles.

of its importance in the act of swallowing, the pharynx exerts an influence on the modulation of the voice, especially in the production of the higher notes.

The pharynx is not so frequent a seat of disease as many other parts of the intestinal tube. In cases of Diphtheria (q.v.) it is usually the chief seat of the disease. It is liable to ordinary inflammation or *pharyngitis*—an affection characterized by pain, especially in swallowing, with redness of the mucous membrane. Little in the way of treatment, except low diet and attention to the bowels, is required; and the inflammation usually terminates in resolution. Sometimes, however,

it precedes suppuration, and abscesses—dangerous chiefly from suffocation due to pressure on the larynx—are formed. These abscesses are more dangerous in the lower than in the upper part of the pharynx, and are more common in young children than in adults. The treatment consists in opening the abscess, which gives immediate relief; but the operation must be conducted with great care, and the incision made as near as possible to the mesial line, by reason of the large adjacent blood-vessels.

PHASCOGALE, *făs-kŏg'a-lē:* genus of marsupial quadrupeds, of which one species, *P. penicillata*, about the size of a rat, gray, with long soft hair and a long tufted tail, is common in most parts of Australia, lives chiefly in the hollows of decayed trees, and preys on small animals of every kind. It is much disliked by the colonists, to whom it is known as the *Tapoa Tafa*, on account of its depredations in poultry-yards and larders. It is very agile and audacious.

PHASCOLOMYS, n. *făs-kŏl'ŏ-mĭs* [Gr. *phaskōlos*, a sac or pouch; *mus*, a mouse]: the wombat of Australia, of which fossil species of very large size have been found in that country in the uppermost Tertiaries: see WOMBAT.

PHASE, n. *fāz*, or PHASIS, *fā'sĭs*, PHASES, n. plu. *fā'sēz* [Gr. *phasis*, appearance; *phainō*, I bring to light—from *phaein*, to shine: It. *fase:* F. *phase*]: appearance or quantity of the illuminating surface exhibited by the moon or other planet; the particular state at any given instant of any phenomenon or appearance, or of any weighty or grave affair; aspect; appearance: transparent green quartz.—*Phases* are the different luminous appearances presented by the moon and several of the planets—sometimes the whole, a part, or none, of the luminous surface being seen from the earth. For the various phases of the moon, and the reasons of them, see MOON. Mercury and Venus, being inferior planets, present to an observer on the earth exactly similar phases to those of the moon; but they require, instead of a month, periods of 116 and 584 days respectively to pass through a complete series of phases. The superior planets, to a certain extent, exhibit phases, but the luminous surface, as seen from the earth, only varies from the full illumination seen when they are in conjunction with the earth to a slightly gibbous appearance when they attain their greatest elongation; and their distance from the sun is so great in comparison with that of the earth, as to render the variation in the form of their luminous surface not observable, except in the case of Mars and occasionally of Jupiter. The term phases is frequently applied to designate the successive stages of an eclipse, lunar or solar.

PHASE: the time relation between alternating or pulsating electric currents or pressure. See ELECTRO-DYNAMICS.

PHASEL, n. *fā′zĕl* [Gr. *phasēlos*, a kidney-bean, a little boat]: the French bean or kidney-bean; the haricot-bean; *Phas′ĕŏlus vulgāris*, ord. *Legumĭnōsæ*, sub-ord. *Papilĭōnācĕæ*. PHASEOLITES, n. plu. *fă-zē′ō-līts* [Gr. *lithos*, a stone]: a fossil genus of leguminous plants.

PHASE′OLUS: see KIDNEY-BEAN.

PHASIANIDÆ, *fā-zĭ-ăn′ĭ-dē:* family of gallinaceous birds, including pheasants, argus, Macartney cock, fowls, impeyans, tragopans, etc.; its limits, however, being extended by some ornithologists to include peacocks and turkeys (*Pavonidæ*), which differ from it by no very considerable character. The hind-toe is higher on the tarsus than the front toes, so that only the tip touches the ground. The wings are short.

PHASIS, n. *fā′sĭs*, PHASES, n. plu. *fā′sēz:* see PHASE.

PHASIS, *fā′sĭs:* river in Colchis, now called the RION. It rises in the mountains of Caucasus, flows generally w., and enters the Euxine near the ancient city of Phasis.

PHASMIDÆ, *făs′mĭ-dē* or *făz′-* [Gr. *phasma*, a spectre]: family of orthopterous insects, allied to *Mantidæ*, but differing in having the fore-legs similar to the other legs, and used like them for locomotion, not for combat and prehension; in the want of stemmatic eyes; and in the similarity of the first joint of the thorax to the other joints. They are insects of very extraordinary appearance, inhabiting tropical countries, and spending their lives on trees and shrubs, whose tender shoots they devour. Some resemble green leaves; some resemble brown and withered leaves; while others, wingless, or nearly so, and with much elongated bodies—one species nine inches in length—resemble dried twigs. To these peculiarities they owe their safety from enemies, eluding observation, for their motions are sluggish. Some are known as Leaf Insects, Spectre Insects, Walking-sticks, etc. The larvæ of the P. resemble the perfect insect.

PHEASANT, n. *fĕz′ănt* [OF. *faisan;* L. *phasĭānus;* Gr. *phasĭānos*, a pheasant—said to be from the river *Phasis*, in Colchis, Asia Minor, whence these birds are said first to have been brought]: wild bird reared and preserved for sport. PHEAS′ANTRY, n. *-rĭ*, an inclosure for breeding and rearing pheasants.—*Pheasant* (*Phasianus*) is a genus of gallinaceous birds of family *Phasianidæ;* having a rather short strong bill, a little curved; the cheeks and skin surrounding the eyes destitute of feathers, and warty; the wings short; the tail long, its feathers so placed as to slope down, roof-like, on either side, the middle feathers longest; the tarsus of the male furnished with a spur. The males of all the species are birds of splendid plumage; the females have shorter tails and dull or sombre colors. There are numerous species, natives of warm and temperate parts of Asia. The COMMON P. (*P. Colchicus*) is said to have been brought from the banks of the Phasis (q.v.), in Colchis, to s. Europe, at a very remote period, its introduction being ascribed in classic legend to the Argonauts. From the Phasis it derived its Greek name *Phasianos*, the origin of its name in English and other modern languages. It was soon naturalized in Europe, over almost all whose temperate parts it is now diffused. The date of its introduction into Britain is not known, but was certainly before the end of the 13th c.: it has long been plentiful in plantations and game-preserves, and has been introduced into almost every part of the country suitable to its habits. The abundance of pheasants in Britain, however, is to be ascribed chiefly to careful game-preservation, without which the race would probably soon be extirpated. No kind of game falls so easy a prey to the poacher.

In the Common P., the head and neck of the male are steel-blue, reflecting brown, green, and purple in different lights; the back and wings show a fine mixture of orange-red, black, brown, and light yellow; the breast and belly are golden-red, each feather margined with black, and reflecting tints of gold and purple. The whole length of a male P. is about three ft., of which the tail often measures two ft. The entire length of the female is about two ft. The general color of the female is pale yellowish-brown varied with darker brown, the sides of the neck tinged with red and green. The ordinary weight of a P. is about two and a half lbs.; but when pheasants are abundantly supplied with food, and kept undisturbed, they are sometimes four or four and a half lbs. in weight. The P., unlike the partridge, is polygamous.

The nest of the P. is on the ground, and is a rude heap of leaves and grasses, in which 11 or 12 olive-brown eggs are laid. But in the half-domesticated state in which it exists in many English preserves, the P. does not give that attention to its eggs and young which it does when more wild, and frequently continues to lay eggs for a considerable time, like the domestic fowl;

the eggs being removed by the gamekeeper, and hatched by hens; with eggs from nests found among clover and hay in the season of mowing. Very young pheasants must be carefully supplied with ants' eggs, maggots, etc., and the whole difficulty of rearing them is in their earliest stage. Pheasants feed indiscriminately on berries, seeds, roots, young shoots of plants, worms, insects, etc. Beans, peas, corn, and buckwheat are frequently thrown for them in open places in woods; and they scrape up bulbous and tuberous roots in winter. They roost in trees at no great height from the ground, and poachers sometimes capture them by burning sulphur below them. During the moulting season, they do not ascend trees to roost, but spend the night on the ground, when they fall a ready prey to foxes. They are fond of woods with thick undergrowth, in which, when disturbed, they naturally seek shelter, running while it is possible, rather than taking flight. The male P. takes flight much more readily than the female, which, apparently trusting to her brown color to escape observation, often remains still until the sportsman is almost upon her. The males and females do not associate together except during the breeding season, but small numbers of one sex are often found in company. The 'short crow' of the males begins to be heard in March. In England and Scotland, pheasant-shooting legally begins Oct. 1, and ends Feb. 3. The pheasants turned out from the gamekeeper's breeding-yard into a preserve are in general supplied with abundance of food during winter, and come to the accustomed call as readily as any kind of poultry, so that the sportsmanship of a *battue*, in which they are killed by scores or hundreds, is of the lowest kind. The flesh of the P. is in high esteem for the table.

The female P., in old age, or when from any cause incapable of the functions of reproduction, sometimes assumes the plumage of the male. The P. has remarkable readiness to hybridize with other gallinaceous birds. A hybrid between it and the common fowl is frequent, and is called a *Pero*. Hybrids between the P. and Black Grouse also have occurred; and hybrids are supposed to have been produced between the P. and Guinea-fowl, and the P. and Turkey. None of these hybrids, however, have ever been known to be fertile, except with one of the original species. On the contrary, the offspring of the Common P. and the RING-NECKED P. (*P. torquatus*) is perfectly fertile, a fact urged in argument by those who regard them as mere varieties of one species. The Ring-necked P. is now almost as plentiful in Britain as the Common P.: it is a native of the forests of India and China, and is said not to breed with the Common P. in a truly wild state, though in Britain they readily intermix. It is distinguished by a white ring almost surrounding the neck, and is of smaller size than the Common P., somewhat different in markings, and has a shorter tail.—The Bo-

HEMIAN P. is another variety, of a silvery-gray color.—White pheasants are not very infrequent.—Of other species of P. are DIARD'S P. (*P. versicolor*), native of Java, in which the prevailing color is green; and REEVES'S P. (*P. Reevesii*), native of n. China, in which white is the prevailing color, and the tail is of extraordinary length, so that a bird not larger than the Common P. measures eight ft. in entire length. Of somewhat different type, more nearly approaching the common fowl, are the GOLDEN P. (*P. pictus* or *Thaumalia picta*) and the SILVER P. (*P.* or *Gallophasis nycthemerus*), both natives of China, and both hardy birds, whose introduction into British preserves has been attempted with prospect of success. Both have long been kept in domestication by the Chinese. The Golden P. is one of the most splendid of the tribe. It has a fine crest, and a ruff of orange and black, capable of being erected at pleasure. The tail is very long. The crest and ruff are held in great estimation by anglers for making artificial flies.—LADY AMHERST'S P. (*P.* or *Thaumalia Amherstiæ*), native of China, resembles the Golden P., and with an extremely long tail.—The Silver P. is one of the largest and most powerful of the tribe, and very combative, driving the Common P. from preserves into which it is introduced. The prevailing color of the upper parts and tail of the male is white, finely pencilled with black, the breast and belly purplish-black.—The name P. is locally applied in the United States to gallinaceous birds of allied genera.

PHEAS'ANT-SHELL (*Phasianella*): genus of gasteropodous mollusks of family *Turbinidæ*, whose shells are valued for their beauty, and when they were rare in collections were sometimes sold for extraordinary prices. They are now comparatively cheap and plentiful, being found in great numbers on parts of the Australian coast.

PHEEZE and PHEESE, v. *fēz:* see FEAZE.

PHELPS, *fĕlps*, ALMIRA (HART) (LINCOLN): 1793, July 15—1884, July 15; b. Berlin, Conn.; daughter of Samue' Hart. She commenced teaching a private school at the age of 19, and afterward became principal of a girls' acad. She married Simeon Lincoln 1817; and after his death in 1823, in connection with her sister, Mrs. Emma Willard, she had charge of a girls' seminary in Troy, N. Y. She married Judge John Phelps of Vt. 1831; taught in Penn. and N. J. 1838–41, and in the latter year, with her husband, took charge of the Patapsco Institute near Baltimore. Her husband died 1847, but she remained in charge of the school till 1855, when she retired to Baltimore. She was a member of the American Assoc. for the Advancement of Science, and wrote a number of educational and other works.

PHELPS, ANSON GREENE: 1781, Mar. 12—1853, Nov. 30; b. Simsbury, Conn. After learning the saddler's trade, he became a merchant in Hartford, and soon opened a branch establishment at Charleston, S. C. He removed to New York 1815, and began dealing in metals and tin-plate; made advantageous investments in real estate, accumulated a large fortune, and engaged earnestly in various benevolent enterprises, to which he was a liberal benefactor. He was interested in foreign missions, and for some time was pres. of the Amer. Board. Besides providing liberally for his 24 grandchildren, he left a large fund, whose income was to be used for benevolent purposes, and bequeathed $371,000 to charitable and religious institutions and societies. He died at New York.

PHELPS, AUSTIN, D.D.: 1820, Jan. 7—1890, Oct. 13; b. W. Brookfield, Mass.: educator. He studied at Hobart College; graduated at the Univ. of Penn. 1837; studied at Andover and Union Theol. seminaries; was pastor of the Pine Street Congl. Church in Boston 1842–48; prof. of sacred rhetoric in Andover Theol. Seminary 1848–79; chairman of the faculty as senior prof. 1869–79; and was made prof. emeritus on resigning 1879. He received his degree from Amherst College 1856. He held the chaplaincy in both branches of the Mass. legislature; and was preacher of the 'election sermon' for the Mass. govt. 1861. He was father of Elizabeth Stuart Phelps Ward. Prof. Phelps's style in writing shows exceeding cultivation, and rises often into high impressiveness: it is always clear and strong. His mental action was orderly, and his lines of thought fall into precise array and move with regular advance. His numerous publications include: *The Still Hour*, a gem of Christian devotional and contemplative literature (Boston 1859, enlarged ed. proof-read just before his death); *Hymns and Choirs* (Andover 1860); *The New Birth* (Boston 1867); *Sabbath Hours* (1870); *Studies of the Old Testament* (1879); *The Theory of Preaching* (1881); *Men and Books* (1882); *My Portfolio* (1882); *English Style* (1883); *My Study* (1885); and *My Note-Book, or Fragmentary Studies in Theology*.

PHELPS, CHARLES EDWARD: born Guilford, Vt., 1833, May 1; son of Judge John and Almira H. L. Phelps. He graduated from Princeton College 1852, studied law at Harvard College, travelled in Europe, and became a lawyer at Baltimore. In 1862 he entered the Union army as lieut.col., served at various points, was promoted col. and brevetted brig.gen.; was a member of congress 1865–69, after which he was again a lawyer in Baltimore. He was elected associate judge for 15 years of the Baltimore superior court 1882, and for several years has been prof. in the law school in that city.

PHELPS, Edward John, ll.d.: jurist: b. Middlebury, Vt., 1822, July 11; d. New Haven, Conn., 1900, March 9. He graduated from Middlebury College 1840; studied law in the office of Horatio Seymour and at Yale; began practice in his native town 1843, but two years later removed to Burlington, Vt. He was 2d comptroller of the U. S. treasury 1851–53, and was a member of the Vermont state constitutional convention 1870; was lecturer on medical jurisprudence at the Univ. of Vermont, and pres. of the Amer. Bar Assoc. 1880. He was law prof. at Yale Univ. from 1881 to 1885; lecturer on constitutional law at Boston Univ. 1882; U. S. minister to England, 1885–98; and 1892–3 a U. S. counsel before Bering Sea tribunal. He then returned to his old professorship at Yale, where he remained till his death. He wrote *The Life and Character of Charles Linsley.*

PHELPS, Elizabeth Stuart: see Ward, Elizabeth Stuart (Phelps).

PHELPS, John Wolcott: 1813, Nov. 13—1885, Feb. 2; b. Guilford, Vt.; son of Judge John P., and descendant of William P. (q.v.). He graduated from West Point 1836, was in the war against the Creeks and Seminoles, and 1838 superintended the removal of the Cherokees from Florida to the west. In the Mexican war he served with distinction, was commissioned capt. 1850, travelled in Europe 1852, spent some time with the Utah expedition, and resigned from the army 1859. On the opening of the civil war he was made brig.-gen., and served at various points. He endeavored to organize a military company of slaves, but was not sustained by the govt. and resigned 1862, Aug. 21. When blacks were enlisted, he was offered the rank of maj.-gen., but declined. He was a prolific writer, a strong opponent of masonic orders, and presidential candidate of the American party 1880. Among his works were *Good Behavior* (1880), and a *History of Madagascar* (1884).

PHELPS, Noah: 1740, Jan. 22—1809, Mar. 4; b. Simsbury, Conn. He was a militia capt. at the opening of the revolution, was an ardent patriot, was one of the projectors of the attack on Fort Ticonderoga 1775, and was the spy who ascertained the condition of the defenses. He was promoted col. 1779, and the following year was employed in transporting cannon to Boston for use on shipboard. After the war he served several terms in the Conn. legislature, and was also a brig.-gen. of the state militia.

PHELPS, Oliver: merchant: 1749–1809, Feb. 21; b. Windsor, Conn. He was for several years a successful merchant in Granville, Mass. During the revolution he was connected with the commissary dept. of the army. In company with Nathaniel Gorham, he bought 2,000,000 acres of land in w. N. Y., which had been ceded to Mass. He devised the system of township sur-

vey now used by the U. S. government, and it is said that at Canandaigua, N. Y., he opened the first land office in this country. With William Hart and others he purchased from Connecticut the 'Western Reserve,' a tract of 3,300,000 acres of land in Ohio. He was interested in the Erie and Welland canals, in steamboat building, was in congress 1803–05, and served as circuit-court judge.

PHELPS, Thomas Stowell: b. Buckfield, Me., 1822, Nov. 2; d. New York, 1901, Jan. 10. He graduated from the U. S. Naval Acad. 1846, served in the war with the Indians in Washington Terr. 1855–6, and was with the Paraguay expedition 1858–9. He was actively employed throughout the civil war, prepared numerous surveys, located buoys, performed the initial work for various expeditions, and rendered brilliant service in several conflicts with Confederate batteries and vessels. He was made lieutenant 1855, lieutenant commander 1862, commander 1865, captain 1871, commodore 1879, rear-admiral 1884. In 1885 he retired. His work, *Reminiscences of Washington Territory*, was published 1882.

PHELPS, William Lyon, a.m., ph.d.: American educator: b. New Haven, Conn., 1865, Jan. 2. He was graduated from Yale in 1887 and is now professor of English literature there. He is the author of *The Beginnings of the English Romantic Movement* (1893); *The Permanent Contribution of the 19th Century to English Literature* (1901); etc.

PHELPS, William Walter, ll.d.: statesman: b. New York, 1839, Aug. 24.; d. Englewood, N. J., 1894, June 16. He graduated from Yale 1860, and from the Columbia Law School 1863; settled at Englewood, N. J.; became counsel for several large corporations, and was offered, but declined, the position of judge. In 1869 he inherited a large fortune, and retired from the law to attend to his estate. He was prominent in the movement which secured for the alumni of Yale Univ. a share in the management of its affairs, and for many years was one of the trustees of the university. He was elected to congress as a republican 1872, became a prominent debater, voted against the Civil Rights Bill, and for the latter act was defeated for re-election. He opposed the third-term movement in favor of Gen. Grant, and supported Blaine in three presidential conventions. He was minister to Austria 1881–2, member of congress 1883–89; in the spring of the latter year was appointed U. S. minister to Germany. In 1893 he was appointed U. S. commissioner to the Samoan conference at Berlin; and June 26, soon after his return home, was appointed judge of the New Jersey court of errors and appeals, which office he resigned a few weeks before his death. He received the degree ll.d from Rutgers College 1889.

PHENACETIN, n. *fĕ-năs'ĕ-tĭn* [from Gr. *phenol* and *acetin*]: in pharmacy, $C_2H_5.O.C_6H_4.NH.COCH_3$, para-acet-

phenetidin, is formed by the action of the strongest acetic acid on para-phenetidin, a body related to both aniline and phenetol. Colorless crystalline scales, odorless, tasteless, slightly soluble in cold water, more so in hot water or alcohol. It has found extensive use as an antipyretic and an analgesic, being one of the safest and most efficient drugs of its kind. Frequently combined with caffeine when used for headache, neuralgia, and the like.

PHENACITE: a colorless, transparent mineral, not unlike quarts, for which it may be easily mistaken. It possesses extraordinary hardness, 7.5 to 7.8, and yields gems of much brilliancy. It occurs in prismatic or in lenticular crystals in Russia and France, also in the United States, at Florissant, and on Mount Antero, Colorado, and in New Hampshire. It is a baryllium and orthosilicate.

PHENACO'DUS: a typical representative of the early extinct, ungulate group *Condylarthra*, whose well-preserved remains are recovered from the Lower Eocene (Wasatch) formations of the central Rocky Mountain region. Two species are well known,—*P. primœvus*, about as large as a tapir, and *P. wortmanni*, smaller. The head was remarkably small, and the brain-cavity relatively so, and the brain itself is smooth; the halves of the lower jaw are not fused at the chin; the dentition is generalized; clavicles are absent; the hind limbs are much larger than the fore limbs, and the feet are nearly plantigrade and five-toed; with the axis passing through the third digit, foreshadowing the condition of the single-hoofed animals (horses). Consult: Woodward, *Vertebrate Palœontology* (1898); Beddard, *Mammalia* (1902).

PHENAKISTOSCOPE, n. *fĕn'ă-kĭs'tō-skōp* [Gr. *phenakis'tĭkos*, deceptive; *phenakizō*, I cheat—from *phenax*, an impostor; *skopĕō*, I view]: a toy instrument for illustrating the persistence of impressions on the retina.

PHENIC ACID, *fē'nĭk* [Gr. *phainō*, I show]: carbolic acid; the hydrated oxide of phenyl; a powerful antiseptic, consisting of colorless crystals obtained from salicylic acid or coal-tar (See CARBOLIC ACID) PHENOL, n. *fē'nōl*, same meaning as *phenic acid*. PHENYL, n. *fē'nĭl* [Gr. *phainō*, I show; *hulē*, material], (C_6H_5): radical of phenol or Carbolic Acid (q.v.). To the large and important Phenol group of compounds belong phenylamine, or Aniline (q.v.), and Trinitrophenic or Picric Acid (q.v.).

PHENICIA, ETC. See PHŒNICIA, ETC.

PHENICINE, n. *fĕn'ĭ-sĭn* [Gr. *phoinix*, purple-red: F. *phénicine*]: indigo-purple or carmine, a powder precipitated by water from a solution of indigo and sulphuric acid.

PHENOGAMIAN, a. *fĕn'ō-gā'mĭ-ăn*, or PHEN'OGAM'IC,

a. *-găm'ĭk*, or PHENOGAMOUS, a. *fĕ-nŏg'ă-mŭs* [Gr. *phainō*, I show; *gamos*, marriage]: same as PHANEROGAMIAN, etc., which see. PHENOGAMS, n. plu. *fē'nō-gămz*, plants which have conspicuous flowers; phanerogams.

PHENOLS [derivation uncertain, but probably from a Greek word signifying 'purple-red,' in allusion to certain color reactions that the phenols yield]; in chemistry, a class of compounds derived from benzene and its homologues, by replacing one or more atoms of the hydrogen of the benzene ring by an equal number of molecules of hydroxyl (OH). The simplest representative of the group is ordinary 'carbolic acid' (q.v.), and this is the compound that is understood when 'phenol' is mentioned without qualification. Carbolic acid has the formula $C_6H_5.OH$, and is derived from benzene by replacing a single hydrogen atom by OH, the benzene being otherwise unchanged. If a second atom of the hydrogen of the benzene ring is replaced by a radical, the resulting compound is still called a 'phenol,' whether the second radical thus introduced is hydroxyl or not. If the second radical is hydroxyl it may be introduced in the 'ortho,' 'meta,' or 'para' position, and although all three of the resulting phenols will have the same empirical formula, $C_6H_4.(OH)_2$, we cannot conclude that they are identical in properties. In fact, we know that they are very different; for they have all been prepared and studied, and they are known, respectively, as 'catechol' (or pyrocatechin), 'resorcinol,' and 'hydroquinone' (or quinol). The cresols (of which there are also three) may be cited as examples of disubstitution derivatives of benzene, in which the substituted radicals are unlike. They have the formula $C_6H_4.(CH_3).OH$, one of the substituted radicals being methyl (CH_3), and the other hydroxyl. The cresols are classed as phenols, because the hydroxyl replaces a hydrogen atom that formed part of the original benzene ring. If one of the hydrogen atoms of benzene is replaced by methyl, we have the compound $C_6H_5.CH_3$, which is called 'toluene,' or 'methyl-benzene.' If we replace one of the hydrogen atoms in the benzene ring of this compound by OH, we shall thereby obtain a phenol; in fact, we shall obtain one of the cresols, just considered. But if we substitute OH for one of the hydrogen atoms in the CH_3 radical of toluene, we shall obtain a compound having the formula $C_6H_5.CH_2.OH$, which is known as 'benzyl alcohol,' but which (although it has the same empirical formula, C_7H_8O, as cresol), is not a phenol, since the OH group does not replace a hydrogen atom of the original benzene ring.

The phenol group, it will be seen, is a very extensive one, and its chemistry is also quite involved. It is likewise highly important in industrial organic chemistry, and many of its members are used as dyes, or in the preparation of dyes. (Consult: Benedikt, *Chemistry of*

the Coal Tar Colors.) As a class, the phenols bear more or less resemblance to the acids and to the alcohols. They dissolve in caustic alkalies with the formation of compounds known as 'phenates,' but many of them are too weakly acid to decompose sodium carbonate in the cold. When some of the substituted radicals are of an acid nature, the resulting phenol is much more acid in nature. Picric acid, for example, which has the formula $C_6H_2(NO_2)_3.OH$, is a phenol, but the presence of the three nitro-groups gives it so acid a character that it forms very stable salts. The resemblance of the phenols to the tertiary alcohols of the fatty series is somewhat marked, but there is no analogy among the products of oxidation in the two cases. Many of the phenols give violet, blue, or green colors when treated with a neutral solution of ferric chloride, ordinary 'carbolic acid' giving a violet. Many also give a blue or a purple, when treated with a mixture of nitrous acid and strong sulphuric acid.

PHENOMENALISM: the doctrine that all human knowledge is limited to events which take place in space and time, or to phenomena (q.v.) as distinguished from noumena. There are several different forms of this doctrine; according to one it is explicitly held that there are realities back of the phenomena, but these realities are unknowable. According to a second form, no decision can be reached as to whether there are realities back of phenomena. Finally, it is sometimes explicitly held that there are no realities other than the facts observed as phenomena. In any of its forms, phenomenalism is a reaction against metaphysical systems which have assumed to describe the essence of reality which obviously can be known, if at all, only through the effects produced upon the mind through the senses.

PHENOMENON, n. *fĕ-nŏm'ĕ-nŏn*, PHENOM'ENA, n. plu. *-ĕ-nă* [L. *phœnom'ĕnon;* Gr. *phainom'ĕna*, appearances—from Gr. *phai'nomai*, I appear; It. *fenomeno;* F. *phénomène*, a phenomenon]: an appearance of nature, the cause of which is not immediately obvious: thence, an unusual appearance; something exceedingly rare; a prodigy. PHENOMENAL, a. *fĕ-nŏm'ĕ-năl*, pertaining to or consisting of phenomena. PHENOM'ENALLY, ad. *-năl-lĭ*. PHENOM'ENOL'OGY, n. *-nŏl'ŏ-jĭ* [Gr. *logos*, discourse]: a history of phenomena, or a description of them.

PHENOMENON, in Philosophy: any fact which is observed. Thus the falling of a body is a natural phenomenon. The rise of an idea is a phenomenon of conscious life. The word is much used in science. In popular thought an observed fact is a matter of special attention only when it is unusual. Thus the word phenomenon has come to be used for rare or extraordinary happenings. In philosophical thought the word phenomenon has taken on great importance as a means of expressing an anthesis between what is seen or pre-

sented to the senses and that which is real and lies back of the sensory experience. Thus Kant established this anthesis by describing the facts of ordinary experience as phenomena. The realities which cause experience he called noumena. The noumena are permanent, invariable, never directly known; the phenomena which arise from the inter-relations of the noumena are transient, variable, directly known forms of experience.

PHEON, n. *fē'on* [probably OF.]: in *her.*, the barbed head of a dart; represented as engrailed on the inner side: its position is with the point downward, unless otherwise blazoned. It is used in Britain as a mark to denote crown property, and called Broad Arrow: see under ARROW.

PHERÆ, *fē'rē:* powerful city of Thessaly, near Mount Pelion; according to legend, the ancient royal seat of Admetus and Alcestis; afterward of political consequence under 'tyrants' of its own, who long made their influence felt in the affairs of Greece, and repeatedly attempted to make themselves masters of Thessaly. One of these, named Alexander, is particularly noted for his cruelties. It was one of his practices to bury innocent persons alive, and another to sew them up in the skins of wild beasts and set his hounds upon them. After a bloody reign of 13 years, he was slain by his wife and her brother, B.C. 357. Five years later, Pheræ, with the rest of Thessaly, became subject to Philip of Macedon.—At Pheræ there was a mineral spring, named Hyperia, famous for its healing virtues. A few ruins at Velestino still mark the site of the city.

PHERECYDES, *fĕr-ē-sī'dēz,* of SYROS: one of the most ancient Greek philosophers: B.C. 6th century; b. in the island of Syros, one of the Cyclades. He is said by Diogenes Laertius to have been a rival of Thales, and to have learned his wisdom from the Egyptians and Chaldeans. He wrote a Cosmogony in a kind of prose resembling poetry, under the title *Heptamychos*, the meaning of which is doubtful, in which, in a manner rather poetic than philosophic, he endeavored to show the origin of all things from three eternal principles—*Time* or *Kronos; Earth,* as the formless and passive mass; and *Æther* or *Zeus*, as the formative principle. He taught the doctrine of the existence of the human soul after death; but it is uncertain if he held the doctrine of the transmigration of souls, afterward promulgated by his disciple, Pythagoras. Of his work, only fragments are extant, collected and elucidated by Sturz (Gera 1798; 2d ed., Leip. 1824).—Another Pherecydes, of Athens, B.C. 5th century, compiled the mythical histories of Athens and other states; of which fragments remain (collected by C. Müller in *Fr. Hist. Gr.*, I.) See Sturz, *Pherecydis Fragmenta* (Leip. 1824).

PHIAL, n. *fī'ăl* [L. *phiălă;* Gr. *phiălē*, a shallow cup or bowl: It. *fiala:* F. *fiole:* OF. *phiole*]: a small glass bottle for holding liquors or medicines; a large glass vessel or bottle: **V.** to preserve or put in a phial. PHI'ALLING, imp. PHI'ALLED, pp. *-ăld:* ADJ. kept in a phial. *Note.*—*Vial* is not strictly synonymous with *phial*—the latter generally implies glass, especially small glass bottles for containing medicines and the like; the former may be composed of other materials, as alabaster, agate, etc. Skeat, however, says *phial* is the altered and more learned form of the old spellings *vial*, *viall*, and *viol.* LEYDEN-PHIAL: see LEYDEN-JAR.

PHIDIAS, *fĭd'ĭ-as* (Gr. *Pheidias*, *fī'dĭ-as*): greatest sculptor of ancient Greece: b. Athens, probably between B.C. 500 and 490; d. about B.C. 432; son of Charmides. His first instructor in art was Hegias of Athens; he studied afterward under a more famous master, Ageladas of Argos. He appears to have acquired distinction in his profession first soon after the battle of Salamis; indeed his great works were all executed during a period most favorable for the development and encouragement of genius, when Greece was triumphant over external enemies, and her people enjoyed fuller liberty than at almost any other period of their history. With the character of the age correspond the works of its poets, particularly of the tragedians Æschylus, Sophocles, and Euripides; and of its sculptors, particularly of Phidias. Under Cimon's administration the Athenians began the work of restoring their city, which the Persians had destroyed, to more than its former magnificence, and of filling it with noble works of art. P. was accordingly employed in making the colossal brazen statue of Minerva, *Athena Promachos*, which was placed upon the citadel, and executed probably about B.C. 460. To the govt. of Cimon succeeded that of Pericles, still more brilliant, and signalized by an extraordinary development of art. Pericles not only gave to P. a commission to execute all the more splendid statues that were to be erected, but made him general superintendent of all works of art going on in the city. Plutarch tells us that P. had under him architects, statuaries, workers in copper and bronze, stone-cutters, gold and ivory beaters, etc. To P., as director-general of all the skilled artists and artificers of Athens, we owe, among other glorious edifices, the Propylæa and the Parthenon, whose sculptured ornaments were executed under his direct superintendence; while the statue of the goddess Athene, whose materials were ivory and gold, was the work of P. himself (about B.C. 438). This statue was clothed with a golden robe, which alone was worth 44 talents of gold. The statue is gone forever, and the Parthenon is now only a magnificent ruin, but there remains splendid evidence of the genius of P., in the sculptures of the metopes, and friezes of the temple of Athene: see ELGIN MARBLES. In the next year P. went to Elis, where he executed a colossal

statue of Zeus for the Olympeium at Olympia (q.v.), also of ivory and gold (about B.C. 433): this was reckoned his masterpiece. On his return to Athens, political passions were running high. There was a strong—at least a violent—party inimical to Pericles; but as they did not dare to attack the great statesman, they assailed him through his friends, P., Anaxagoras, Aspasia, etc. P. was accused of having appropriated to himself some portion of the gold intended for the robe of Athene. This accusation he repelled by taking off the robe and weighing it. He was then accused of impiety, for having introduced his own likeness and that of Pericles on the shield of the goddess. On this most frivolous and contemptible pretext he was thrown into prison, and died there, but whether of sickness or poison is uncertain. The works executed by or ascribed to P. were numerous, but those above mentioned are the most celebrated. Their prevailing characteristic appears to have been an ideal sublimity; and even the imperfect relics that remain are the most noble specimens of sculpture in the world.

PHIGALIAN MAR'BLES, *fi-gā'lĭ-an:* sculptured frieze taken from the cella of the temple of Apollo Epicurius at Phigalia, an ancient town in Arcadia, and transferred 1814 to the British Museum. It represents the contests between the Centaurs and Lapithæ. The Phigalian temple of Apollo is, next to the Theseium at Athens, the most perfect architectural ruin in all Greece; but in its sequestered position at the head of a lonely and rocky glen, among the Arcadian hills, it long remained unknown in modern times, except to the shepherds of the district. Chandler first visited and described it 1765. The temple is of hard yellowish-brown limestone, stands n. and s., was originally about 125 ft. long and 48 broad, and had 15 columns on each side, and 6 on each front, in all 42, of which 36 still remain. The marbles brought to London are the most exquisite remains of Greek art in Britain

PHILADELPHIA, *fĭl-a-dĕl'fĭ-a:* city, coextensive with P. co., Penn.; on the Delaware and Schuylkill rivers, and on six important railroads; 85 m. s.w. of New York, 96 m. direct w. of the Atlantic Ocean, 125 m. direct n.e. of Washington; lat. of new public buildings 39° 57′ 7.5″ n., long. 75° 9′ 23.4″ w.; 129.4 sq. m.; rank (1900) 3d in area and in population. Of the total area, 108 sq. m. are between the two rivers and n. of their junction, and 21.4 are on the w. side of the Schuylkill. The Delaware river is navigable to the city for the largest ships; the Schuylkill for vessels of less size. The city has 5 m. of wharves on the Delaware river front, and 4 m. on the Schuylkill front; the Delaware channel here is 35–40 ft. deep at low water, the Schuylkill 18 ft. About 4 sq. m. in the portion of the city are below low tide and occupied by truck farms; one-fourth the area near the n. and w. boundaries is open farm-land; 50 sq. m. are suburban land undergoing improvement; and 40 sq. m. are urban territory, chiefly n. of the city hall. The surface slopes from 10 ft. above sea-level in the s. portion n.w. to 446 ft. at Chestnut Hill, and is underlaid by gneiss rock.

The city was originally laid out in parallelograms of about 4 acres each, with streets at right angles to each other. Market street is the dividing line between the n. and s. portions of the city; Broad street extends through the entire city, from League Island to the Montgomery co. boundary line. Market street is 100 ft. wide, Broad 113, Spring Garden 120, and other principal ones from 100 to 50. The houses are numbered by the decimal system, 100 to the block, even numbers on the s. and w. sides of streets, odd numbers on the n. and e. sides. In 1903 there were 1,661.89 m. of streets (1,224.89 paved). The city has been entirely repaved since 1880. The cost of cleaning the streets (1902) was $720,890, and of lighting them $1,009,357. There is a sewerage system of 951 miles, the sewers as a rule following the drainage basin of old streams; they dispose of a rainfall varying from 23 to 67 inches annually. The sewage of the city is emptied into the Schuylkill and Delaware, which rivers also supply the city water. Deaths from typhoid fever averaged 611 annually for the years 1898–1902.

City transit is facilitated by a combined elevated and subway system opened in December, 1905. The tunnel under Market street runs from river to river; there is a bridge over the Schuylkill, and the elevated road extends to the city limits in W. Philadelphia. The subway is constructed with four tracks. Other subways and elevated lines are under construction.

The city is supplied with water from the Schuylkill (90 per cent.) and Delaware (10 per cent.) rivers, by pumping with water or steam power into reservoirs, pumping by steam power into stand-pipes, and directly into distribution-pipes. The system had (1890) 9 reservoirs, with capacity of 891,491,454 gallons; full daily

pumping capacity was 185,290,000 gallons; and average daily consumption 116,500,000 gallons. There were 930 m. of mains, 7,433 hydrants, 646 fountains, 343 watering troughs, and 12,246 valves. In 1902 there were 1,309 m. of mains and the average daily consumption was 279,975,453 gallons; cost of works $37,000,000.

There are 50 public parks in the city, aggregate area 3,505.93 acres. The principal park, the largest in the United States and one of the largest in the world, is named Fairmount, from Fairmount Hill on the Schuylkill river, on the summit of which are the four great reservoirs of the water-works system. It is a tract of great natural beauty, is pleasingly diversified in surface, and exhibits the highest order of landscape-gardening. It extends along both banks of the Schuylkill river more than 7 m., and along both banks of Wissahickon creek for more than 6 m.; is nearly 14 m. in extreme length; varies from ½ m. to 2 m. in width; and comprises 2,791½ acres. The Centennial Exhibition (q.v.) 1876 was held on a plot of 236 acres in Fairmount Park, at the head of Girard avenue. Of the 5 main exhibition buildings, Memorial Hall, erected jointly by the state and city for the fine-art display at a cost of $1,500,000, and Horticultural Hall, of stone, glass, and iron (cost $251,937), were designed for permanent use; and are now occupied by the Penn. Museum of Industrial Art and by the Conservatory respectively. The Main Exhibition Building was allowed to stand for several years, and was used for general exhibition purposes. The park contains also a grand zoological garden (1874), the first established by an American city; numerous minor buildings; Randolph Roger's colossal bronze statue of Abraham Lincoln; several handsome bridges across the Schuylkill river; Lemon Hill; George's Hill; observatory; Sedgeley Hill; Belmont Glen; and countless objects to please and instruct.

Finances and Banking.—The city debt (1889, Jan. 1) was $57,942,934; assets in securities $30,707,780, in real estate $42,964,344; excess of assets over liabilities $15,729,190. In 1897, Jan. 1, the total bonded debt was $54,023,120, outstanding warrants $1,031,810, total debt $55,854,930; sinking fund $19,575,350, leaving the net debt $35,479,580; besides the sinking fund the city had cash assets amounting to $8,296,590; real estate owned by the city $52,774,894; assessed real and personal valuation of taxable property $818,827,549. In 1903, Jan. 1, the net debt was $50,055,395; tax rate $18.50 per $1,000; annual cost of maintaining the city government, $30,113,147; assessed value of real estate, $917,208,060; of personal property $1,649,799. In 1902 P. had 35 national banks, with total loans and discounts outstanding, $158,086,371; total capital stock, $21,405,000; total circulation, $9,245,583. There were 28 (1890) fire insurance companies (cap. of 19, $8,283,907). assets of all $37,442,567, and liabilities of all, ex-

cepting scrip, cap., and net surplus, $16,725,163. Of 5 life insurance cos., American Girard Life Ins. Annuity and Trust, Penn. Mutual, Presb. Ministers' Fund, and Provident Life and Trust, American, Girard and Provident reported cap. $2,000,000, the Girard ranking 2d as to age in U. S. Presb. Ministers' Fund, org. 1759, ranked 1st as to age in U. S.

Commerce.—P. constitutes one U. S. customs district and one U. S. internal revenue district. During the fiscal year ended 1903, June 30, the imports and exports were: Imports, $59,995,431; exports, $73,531,968; receipts of flour and grain, 38,008,306 bbls. In 1902, December, the tonnage of foreign vessels entering the port was 142,220; of American vessels, 10,640; exports of beef cattle numbered 28,643, value $2,861,390; value of breadstuffs $18,815,383; of provisions $17,242,064; coastwise shipments of coal 2,450,000 tons. (For U. S. naval constructions, see PENNSYLVANIA—*Ship-building.*) Commerce is facilitated by the Pennsylvania railroad system, comprising 7,521 m. of railroad and 392 m. of canals; Lehigh Valley railroad and its Morris and Essex canal; Reading railroad system; and the Baltimore and Ohio, P., Wilmington and Baltimore, N. Pennsylvania, Camden and Atlantic, W. Jersey, Westchester and P., and P. and Atlantic City railroads; and ocean steamship lines plying regularly between P. and Liverpool, Glasgow, New York, Boston, Savannah, Charleston, and other ports.

Manufactures.—Manufacturing in P. and adjacent parts of Pennsylvania was greatly stimulated at the end of the 18th century by the activity of Benjamin Franklin. The Society of Arts, the American Philosophical Society, and other similar societies in P. offered prizes for inventions which were desired in various lines of manufacturing. In 1883 a textile department was added to the Pennsylvania Museum and School of Industrial Art and more recently the Philadelphia Commercial Museum (see MUSEUMS) has been organized to assist American manufactures to compete in foreign markets.

P. is the largest centre of the textile manufacturing industry in the country; Penn., as a state, ranking second in the U. S. The manufacture of silk takes the first place as regards the value of products. The culture of silk was encouraged early in the history of the state and in 1750 a filature for reeling silk from cocoons was opened in P. under the patronage of Benjamin Franklin and others. Fringes, tassels and coach laces began to be manufactured in 1793, and about 1837 power looms were introduced for weaving ribbons. After 1839 attention was devoted to the manufacture of silk rather than to its culture. In the manufacture of cotton goods also P. takes a leading position. A spinning jenny of 24 threads was put into operation here in 1775, and probably the first factory-made jeans and fustians made in the U. S. were made here. The

use of cotton for decorative fabrics originated in P. and this industry has been brought to great perfection. The manufacture of woolen goods in the state of Penn., which ranks second in the U. S., is centered in P. The industry was established by English settlers on the Schuylkill and in the early days there were a large number of independent factories, many of them using hand looms. The carpet industry was early introduced into P. In 1791 there was a factory making Turkey and Axminster carpets, and in 1810 7,501 yards of carpet were made in this city. The manufacture of Smyrna rugs was brought to great perfection in P. soon after its introduction from England about 1876. Probably more ingrain carpets are made in P. to-day than in any other city of the world. P. is also an important centre for the manufacture of worsted, hosiery and knit goods. Some of the most famous and successful knitting machines have been invented here. The German exhibits of hosiery at the semi-annual fairs instituted by Penn in P. were one of the most interesting features. Calico printing from wooden blocks was done here as early as 1788, and in 1809 the first goods in the U. S. to be printed upon engraved copper rollers were printed near P., the machinery for the purpose having been imported from England. Locomotive building was begun in P. in 1831, one year after the first locomotive for actual use was made in the U. S., and the next year 'Old Ironsides,' a locomotive with a stiff wooden frame, was completed for a local railroad. To-day P. contains the largest locomotive works—and manufactures one-third of all the locomotives made—in the United States. The first printing press made in the U. S. was made in P. in the shop of Adam Ramage, in 1795. In 1810 there were 2 printing press factories with an annual output of $26,000, and 2 manufactories of hydraulic engines with an output of $25,000. The printing industry has had a long history in P. In 1686, 4 years after the first English settlement in the colony, the first printing press in Penn. was put up in this city, and in 1741 Franklin attempted to publish magazines and periodicals. By 1810 it was estimated that half a million volumes were annually printed in P. For fifty years after the Revolution this city led in the printing industry, and the first daily newspaper in the U. S. was established here. Soon after the beginning of the nineteenth century more wooden presses were in operation in P. than in any other English-speaking city in the world, London excepted. P. also has establishments for the refining of sugar, molasses and petroleum, for the manufacture of liquors and tobacco, and of boots and shoes, etc. P. has from the first taken an important place in the shipbuilding industry, beginning with the time of William Penn. In 1775 P. was the leading shipbuilding center and in 1793 twice as many ships were made here as anywhere else in the U. S.

The first six ships of the navy were designed by a shipbuilder of P., Joseph Humphreys, and more of the steel ships recently built for the navy have been constructed at P. than at any other point. P. had (1900) 15,887 manufacturing establishments, with $476,529,407 capital, of which $64,859,709 represented buildings; average number of employees 246,445, of whom 18,062 were members of firms, officers and clerks, 172,011 men 16 years and over, 12,746 children; total wages $111,847,076; materials used $326,877,441, including $6,193,301 for fuel and rent of power and heat; products $603,466,526.

The capital invested in foundry and machine shop products is nearly double that invested in any other industry, and exceeds $45,000,000. The two next important industries are the manufacture of brewery products, with $27,600,000 capital, and the refining of sugar and molasses, with $23,992,000. In connection with manufacture mention must be made of the efforts made by the John B. Stetson Co. for the welfare of its employees. This co. is engaged in the manufacture of fur-felt hats and in 1903 employed over 2,400 persons, producing 102,181 dozens of hats. The co. has adopted various methods to better the condition of the people employed by it; it encourages saving and home-building in the strongest way possible. As a reward for good service it offers shares in a building and loan association conducted by the company, upon which money can be borrowed for the purchase of homes. It is said that 15% of the adult male employees now own their homes, while 289 hold shares in the association. To encourage employees to save their money the Stetson savings fund was established in 1897. At the time of the last report there was an average of $76.24 for each depositor. The company has also adopted a unique system of profit sharing, whereby 5,000 shares of the stock are distributed among the employees at the discretion of the directors in such a way as to insure a steady income for the employee, while preventing him from disposing of his stock. Besides these features the company maintains a beneficial fund and a system of premiums for regular and faithful work. Another form of reward is the presentation of life-insurance policies, and at Christmas time prizes of various kinds are distributed for work of special merit. The company has erected a large assembly hall for its employees and maintains an organization similar to the Y. M. C. A., called the John B. Stetson Union. The operatives have access, free of charge, to a large library and reading room, containing 2,000 volumes and the leading newspapers and periodicals. A hospital is now being constructed for the medical department established by the company for the benefit of its operatives. It is claimed by the company that as a result of its efforts for the well-being of its employees the quality and quantity of the work done in the factory has greatly improved, and

that there has been an increase in the company's business and profits.

Religion and Charities.—There are nearly 1,000 churches, missions, and preaching places in P. representing all denominations, including the peculiar sect of Dunkards. The Methodist Episcopal Church takes the lead in the number of its churches, the Roman Catholic holding the second place; the Presbyterian Church and the Protestant Episcopal Church have the next largest number. As regards members, however, the Roman Catholic Church is far in the lead, having more members than all other denominations combined. In 1903 there was 2,376 associations devoted to humane ends. Included in this number are 40 children's asylums, 12 day nurseries, and 8 general agencies for the relief of children; 22 general and 40 special hospitals; the Pennsylvania Institution for the Deaf and Dumb, established in 1820; Pennsylvania Institution for Blind, established 1820; Pennsylvania Training School for Feeble-Minded Children, established 1853; Children's Aid Society; Society to Protect Children from Cruelty, and many other charitable institutions. The State Board of Charities has 35 hospitals, of which the Philadelphia or City Hospital is the largest. The Pennsylvania Hospital was founded in 1752 by Benjamin Franklin and others. The oldest church structure in the city is the Swedes' Church, on Swanson street, near Christian, a brick building erected 1700 to replace one of logs built 1677. It is surrounded by a cemetery with gravestones as old as the building, and is still used regularly. The next oldest is Christ Church (Prot. Episc.), on Second street near Market, begun 1727, finished 1754. It stands on the site of the first Christ Church, erected 1695, has a steeple 196 ft. high, contains the oldest chime of bells in the United States and a set of communion plate presented by Queen Anne, and was restored to its old-time appearance 1882. The third oldest is St. Peter's Church (Prot. Episc.), on Third and Pine streets, begun 1758, finished 1761, with cemetery containing a monument to Com. Decatur. Other notable edifices are the Cathedral of SS. Peter and Paul (Rom. Cath.), Logan sq., at Eighteenth street, largest church in the city, with dome 210 ft. high, Corinthian columns on facade, and altar-piece by Brumidi; Central Congl. Church, Green and Eighteenth streets, Norman. in style; West Arch Street Presb. Church, Roman-Corinthian in style; St. Andrew's Church (Prot. Episc.), Eighth street near Spruce, Grecian-Ionic; St. Stephen's Church (Prot. Episc.), Fourth street, Gothic; Arch Street Meth. Episc. Church, white marble; Lutheran Church, green serpentine, Gothic; Synagogue, Broad street near Green, Saracenic; and the Friends' Meeting House, on Arch and Fourth streets. Bethany Church (Presb.) has the largest Sunday-school in the United States, averaging 110 teachers and 2,400 scholars, with 1,800 in average attendance.

John Wanamaker, ex-U. S. postmaster-gen., was its supt. 1902.

Education.—There have been three stages of education in the city. During the period from 1681 until 1817 there were no public schools, and there was no education except in schools demanding a fee for admission; from 1817 to 1830 there were public schools, but they were open only to those unable to pay a fee; since 1830 there have been public schools free to all. In 1663 provision was made by the Provincial Council for hiring a schoolmaster, and regular fees were established for his tuition. The 'William Penn Charter School' was opened in 1689 and chartered in 1697; it is still in existence, the present building being located at 12th and Market streets. The University of Pennsylvania grew out of the Academy and Charitable School of the Province of Pennsylvania, outlined by Benjamin Franklin in 1749. In connection with this the Common Council of the city in 1750 established a system of scholarships, giving £200 in cash, £50 annually for 5 years, and £50 in addition for every scholar sent to the Charity Department. In 1818 the city began to make provision for poor children, and in 1819 there were 10 public schools (subject to the provision mentioned above), 10 teachers, and 2,845 pupils. In 1895 P. had 41,000 (estimated) children in private and parochial schools and 163,515 in the public schools, making a total enrollment of 204,515. In the public schools the average daily attendance was 111,361; the aggregate days' attendance was 22,160,830; number school days actually taught, 199. Teachers numbered 3,095 (152 males, 2,943 females), supervising officers 104; number of buildings used for school purposes 289, value $11,273,573, seating capacity 136,784. Receipts for the school year were, from the state $1,000,000, city taxes $2,563,497, total $3,563,497. In 1902 the pupils enrolled in public schools numbered 152,889; the annual cost of maintaining the schools was $4,223,271. P. had (1901) four public high schools, as follows: Central Manual Training High School, 453 students; Girls' High School, 1,669 students; North East Manual Training High School, 426 students; Commercial High School for Girls, 1,207 students. Private endowed academies, seminaries and other schools for secondary instruction numbered 18, of which 3 were Episcopal, 1 Lutheran, 2 Roman Catholic, 4 Friends, and the rest nonsectarian.

For higher education there are three colleges and universities: University of Pennsylvania, La Salle College, and Central High School; 5 theol. schools, including the Divinity School of the Protestant Episcopal Church and the Evangelical Lutheran Theol. Seminary; there are 2 law schools; of Temple College and the Univ. of Pennsylvania; the medical schools were: Jefferson Medical College, Medico-Chirurgical College, University of Pennsylvania Medical Department, the Woman's Medi-

cal College of Pennsylvania, Hahnemann Medical College, Philadelphia Polyclinic and College for Moderates, Philadelphia Post-Graduate School of Homeopathics. Among the other schools were: Philadelphia College of Pharmacy, Philadelphia Normal School for Girls, Pierce School (Commercial). Schools for defectives and delinquents were as follows: Pennsylvania Institution for the Deaf and Dumb, Home for Training in Speech of Deaf Children, Pennsylvania Institution for the Instruction of the Blind, House of Refuge (Reformatory); training schools for nurses in the city numbered 27, and were connected with the various hospitals and medical schools.

U. S. Mint.—P. has the principal mint of the U. S. govt., a gray granite building in the Italian renaissance style, cost $2,000,000, on the corner of 16th and Spring Garden streets. It contains the largest and most valuable collection of coins and gold and silver medals in the United States; has the latest appliances for assaying, melting, refining, and coining; and is open to the public daily excepting Sundays from 9 A. M. till 12 M.

Public Buildings.—The buildings owned wholly or in part by the city and used for municipal purposes are the City Hall, locally known as the New Public Buildings, of marble, on Penn square, or intersection of Broad and Market streets; Independence Hall, brick, Chestnut street; 6 court houses, brick, cost $1,400,000; jail, stone, $300,000; 26 police stations, stone and brick, $622,000; 24 engine-houses, stone and brick, $300,500; 5 markets, frame and iron, $187,500; hospital, stone, $1,525,000; house of correction, stone, $800,000; 6 public baths, brick and stone, $41,290; 211 school-houses, brick and stone, $7,594,288; 16 buildings connected with water plant, brick and stone, $6,853,000; and 71 buildings connected with gas plant, brick and stone, $2,978,000. The city (1890) held in trust bldgs., also valued at $9,598,907, had sundry pieces of real estate, including wharves and landings, which made the total value $65,325,479. The buildings owned or occupied by the U. S. govt. are the new Post-office and Court-house (cost $8,000,000); Custom-house and Sub-Treasury; Naval Asylum; Naval Hospital; Appraisers' Building; Mint; Schuylkill (Gray's Ferry Road) and Frankford (Tacony Road) Arsenals; and Navy-yard on League Island, in the Delaware river. The most notable building architecturally is the new City Hall, of marble and granite begun 1871, total cost $25,000,000. It covers, exclusive of its court-yard, nearly 4½ acres. The n. and s. fronts measure 470 ft., and the e. and w. fronts 486½ ft., in extreme length. The four fronts are similar in design, with an entrance pavilion 90 ft. wide, 185 ft. high, and having receding wings of 128 ft. elevation, in the centre of each. The fronts terminate at the corners with towers 51 ft. sq. and 145 ft. high. Archways 18 ft. wide and 36 ft. high, opening through

each of the four central pavilions, constitute the principal entrances, and afford passages for pedestrians directly through the structure. In the centre of the group of buildings, which constitute a single harmonious edifice, is a court-yard 200 ft. sq., supplying light and air to the various apartments. From the n. side of this space rises a grand tower, 90 ft. sq. at base, falling off at each of the four stories, till it becomes, at the spring of the dome, an octagon 50 ft. in diameter. A colossal statue of William Penn has been placed on the summit of the dome, which gives the tower a total height of 537 ft. 4½ in. Besides the City Hall, the new Post-office, Masonic Temple, *Public Ledger*, *Record*, and *Times* newspaper buildings, Horticultural Hall, Univ. of Penn., Y. M. C. A. Hall, Acad. of Fine Arts, Union League Club, Merchants' Exchange, Acad. of Natural Sciences, Ridgway Library, and the Philadelphia, First National, Drexel, and Girard Banks, are among the strikingly attractive edifices of the city. The Land Title, North American, Real Estate Trust, and Betz buildings are modern 'skyscrapers.'

The most notable buildings historically, besides the Swedes' Church and Christ Church, are the old State-house, on Chestnut st., between 5th and 6th sts.; Carpenters' Hall, in rear of Chestnut street e. of 4th st.; the Penn. Hospital, on Spruce, Pine, 8th, and 9th sts.; and the U. S. Custom-house, which was built for the first U. S. Bank. The name Independence Hall is now usually given to the whole of the State-house building, though properly it applies only to the e. room on the lower floor, where the second congress sat when it adopted the Declaration of Independence. The building was begun 1731, occupied 1735, and contains precious memorials of the dawn of American independence. Carpenters' Hall was built 1770 by the Carpenters' Company, which still owns it; and was the place of meeting of the first continental congress 1774. The Penn. Hospital occupies an entire square and was begun 1775.

History.—The first settlements on the site of Philadelphia were made by Swedes and Dutch in the early part of the 17th century, but they were not prosperous, and there were only a few hundred settlers in the vicinity when William Penn received a grant of the territory 1681. In 1682 he visited the site, and laid out his plan for the city. In 1692 Penn was deprived of his government, and the colony was annexed to New York, but in 1694 it was again restored to him, and in 1701 Penn granted the city a charter. This charter, modelled on that of Bristol, England, provided for a mayor and council. The discovery of a prior charter was made 1887 by E. P. Allison and Boies Penrose, while collecting material for their *History of the Municipal Government of Philadelphia from* 1681 *to* 1887. They found among the papers of Alexander Biddle, whose grandfather was Washington's quartermaster, a charter dated '20th day of the Third Month in the

COLONNADE OF PTOLOMY, ISLAND OF PHILAE.

third year in the reign of William and Mary, Anno Domini 1691,' signed 'Thomas Lloyd, Deputy Governor,' and attested as having been recorded in the 'Office of Rolls and Public Registry at Philadelphia, on the 29th of the Third Month, 1691,' by David Lloyd, deputy master of the rolls. The charter created a government with a mayor, aldermen, and a council of 12 members. But no records were found of this early government, and if the charter was ever in active operation, the records must have been lost, as were those of the provincial council of the same year, during the Revolutionary war. The charter of 1701 was altered in 1789; this new act provided for a mayor elected biennially, a select council, elected one from each ward for three years, and a common council, and many numerous smaller officials and boards. During the Revolutionary war, Philadelphia was the seat of the Continental Congress, for the greater part of the time; from 1777, Sept. 6 to 1778 June, however, it was occupied by the British; the Declaration of Independence was signed here in 1776; and the convention to frame the federal constitution met in the city in 1787. Very naturally P. became the first capital under the federal government, and both George Washington and John Adams were inaugurated in the State-house. The city was also the capital of the colony and the state until 1799. The growth of the city was rapid until the war of 1812, which virtually destroyed the foreign commerce, and kept general business at a low ebb. The first bank of the United States was established in P. in 1791, and the second in 1816. From 1820 to 1837, there was another period of commercial and industrial growth, but the city suffered severely from the financial crisis of 1837, which resulted finally in the failure of the United States Bank. P. was ravaged by yellow fever in 1793, 1797, and 1798, and by Asiatic cholera in 1832. In the early days of the abolition movement it was the scene of a number of riots, and of 'Native American' riots in 1844. The city was enlarged by the consolidating act of 1854, by which the whole of the county was included in the city corporation, and several townships absorbed. During the civil war the city provided the Union armies with 80 regts. for various periods; the Union volunteer and the Cooper refreshment establishments gave free meals to more than 1,000,000 soldiers passing through the city on the way to the battle-field or home; and a fair to raise money for the use of the U. S. Sanitary Commission yielded $1,080,000. Another period of industrial expansion succeeded, and with a break of a few years of depression in 1877 to 1880 the growth of the city has been continuous and steady. The Centennial Exhibition (q.v.) was held in Fairmount Park 1876, May 10—Nov. 10; the bi-centennial of the landing of William Penn was celebrated 1882; bi-centennial of the settlement of Germantown by the German colony under Pastorius 1884;

and the centennial of the signing of the federal constitution in P. 1887, Sept. 17.

In 1885, the city government was again altered, the mayor's term extended to four years, and his powers greatly increased. The city offices were consolidated under departments, the heads of which were appointed by the mayor. Under this charter a powerful political machine within the Republican party, was built up largely through the skillful use of the large amount of patronage involved in the numerous offices. The hold of this machine was strengthened by the fact that the people of P. are notably prosperous and contented, and that the extravagance and wastefulness of the city government did not often visibly affect their comfort and prosperity. Moreover it was the custom of the officials to grant favors to business men and others who supported the 'Organization,' while those openly opposing it would suffer continual interference through some one or other of the city offices. The machine at first had put men of good personal character in the more important offices; but as their power increased, ward leaders and others without regard to ability or fitness were elected. There was also a systematic dishonesty at the polls, particularly false registration, the stuffing of ballot boxes, etc., and this where it was entirely unnecessary, as the city was naturally strongly Republican. For some years there had been an organization striving for better government, known as the Municipal League, which, however, never had become a power in city life. In November, 1904, after the national election, this league disbanded, first sending out a call for a meeting of representative citizens to consider the question of municipal reform. The meeting was well attended, and a Committee of Seventy appointed to take up the detail work of organized opposition. The result was that a new party, known as the City Party, was organized, which in the February elections of 1905 nominated candidates in several wards; they were in most cases defeated. The Committee of Seventy then began a series of prosecutions for election frauds, which revealed such a state of dishonesty that public opinion was more generally aroused than ever before. In May, 1905, an attempt was made in the council to pass a measure leasing the city gas works to a private corporation (controlled by politicians) for 75 years. This Mayor Weaver vetoed, and though he had been elected by the 'Organization,' he publicly declared against them and in favor of the City Party; he also dismissed the director of public safety and public works, and appointed in their places men active in the reform work. The citizens rallied to his support, and by using even such extreme measures as boycotting and social ostracism against councilmen that had voted for the lease, they forced the council to support the mayor's veto, and so finally broke the hold of the machine. In November, 1905, the City

Party had a full ticket in the field, which was supported by the Democrats and the Prohibitionists, and won the election by over 50,000. The effects of a year of reform administration was shown by the comptroller's report for 1906, showing an unexpected surplus in the treasury, while the tax rate had not been increased. At the same time the reports of the other departments showed an increase of efficiency in service, particularly in the police department, and an economy effected largely through care in letting contracts.

Population.—(1778) 21,767; (1790) 28,522; (1800) 41,220; (1810) 53,772; (1820) 63,802; (1830) 80,458; (1840) 93,665; (1850) 121,376; (1860) city and county, 565,529; (1870) 674,022; (1880) 864,984; (1890) 1,046,252; (1900) 1,293,697; (1910) 1,549,008.

PHILADELPHIA ACADEMY OF SCIENCES, an institution for the advancement of learning in the natural sciences, founded in 1812. It has a large and handsome building in the city of Philadelphia, and a number of valuable scientific collections, including the largest collections of shells in the world, a rich collection in fossils, and several collections of birds. It publishes a 'Journal' and 'Proceedings.'

PHILADELPHIA, Destruction of the, one of the greatest exploits in naval history. This American frigate pursued a piratical Moorish vessel into the harbor of Tripoli, 3 Oct. 1803. In endeavoring to beat off from the harbor the *Philadelphia* struck on a sunken rock, which was not laid down in the charts. The Tripolitans at once trained their powerful batteries on the helpless vessel, and Captain Bainbridge, in command of the *Philadelphia,* had no resort except to surrender. Captain Bainbridge succeeded in sending information of his misfortune to Commodore Preble, in command of the American squadron, at Malta. Meantime the Tripolitans had worked the frigate off the rock, and removed it into the harbor, where they were fitting it out to be used against the Americans. Commodore Preble assigned Lieutenant Stephen Decatur to the dangerous task of entering the harbor of Tripoli, and destroying the *Philadelphia* under the guns of the forts. Lieutenant Decatur with 70 volunteers, started on his errand in a small vessel called a 'ketch,' which had been captured by the Americans, and christened the *Intrepid.* It was a moonlight evening, and as the officers and men were concealed below, the *Intrepid* looked to the Tripolitans like an innocent merchant vessel. A hail from the *Philadelphia* was answered in Maltese, and as the *Intrepid* was warped alongside the frigate, the Americans sprang from concealment, rushed on board, and after a fierce hand-to-hand fight, drove the Tripolitans into the sea. Then the *Philadelphia* was set on fire, and under the glare of the flames, and amid the thunder of cannon, Decatur and his men retired in safety from the harbor.

PHILADEL′PHIA, in Lydia: see ALA-SHEHR.

PHILADEL′PHIA, in Palestine: see AMMONITES.

PHILADELPHIAN, a. *fĭl′ă-dĕl′fĭ-ăn* [Gr. *philos*, loved; *adelphos*, a brother]: pertaining to the city Philadelphia: N. an inhabitant of.

PHILADELPHUS, *fĭl-a-dĕl′fŭs:* genus of shrubs of the order *Philadelphaceæ* (Syringas) formerly; but placed by Gray under *Saxifragaceæ*. It has a turbinate calyx; sepals and petals each 4–5; stamens 20–40; styles 3–5, united below, and as many capsular cells, with numerous small seeds on axile placentæ; leaves opposite; flowers solitary or cymose-clustered, sometimes axillary. The N. Amer. scentless southern species, P. *inodorus*, with pure white flowers, has a large-flowered variety, *grandiflorus*, often cultivated. The best known, *P. coronarius*, Mock Orange, sometimes Syringa, has fragrant flowers and is of foreign origin. One species occurs on the Himalayas at an altitude of 6,000—7,000 feet.

PHILÆ, *fī′lē:* famous island in the Nile, s. of Syene, beyond the s. frontier of Egypt; 24° 1′ 28″ n. lat.; about 550 m. in a straight line from the mouth of the Nile (much farther by the windings of the river). It was called by the Egyptians Menlak, the place of the Cataract; or *Menuab*, the Abaton or Sanctuary; and by the Copts, Pilak, or 'Cataracts.' It is a granite rock, about 1,000 ft. long, and about 500 ft. broad, on which is placed a suite of buildings, not of the most remote antiquity, but of great architectural beauty. The oldest, a hypæthral or roofless hall, was built in the reign of Nectanebus I., B.C. 377–357. A second mention of the same monarch occurs on the first propylon, where a door, constructed in his reign, has been incorporated into the constructions by a later Ptolemy. Both these are dedicated to the goddess Isis, who in P. was venerated as Athor or the Egyptian Venus. The principal remains consist of the great temple of Isis, erected by Ptolemy II., or Philadelphus, and continued by his successors, especially by Ptolemy III., or Euergetes, B.C. 247–222.

The temple consists of a shrine or sekos, a pronaos, an open portico, and two pylons or gateways. Both of the propylons were constructed by Ptolemy VII., or Philometer, and Lathyrus; but the first received an addition from Ptolemy IX., or Euergetes II., B.C. 145–141. On the second pylon, the monarch is represented slaying the hostile nations. The colonnade was erected principally by Tiberius. The charming little temple, the Mastabat el Pharaonn, or Pharaoh's Bed of the Arabs, was made in the reign of Trajan, A.D. 100. The temples are important particularly as containing the principal representations of the story of Osiris, his birth, bringing up, death, and embalmment by Isis. Commenced in the reign of Nectanebus I., and continued by the Ptole-

mies and Romans, the worship of Isis lingered here till A.D. 453, or 60 years later than the edict of Theodosius. After the subjection of the Blemmyes to the Nubian Christians, the temple was converted into a church, and the paintings daubed with mud; and A.D. 577 the bishop Theodorous changed the pronaos of the temple of Isis into the church of St. Stephen; and a Coptic church, at a later period, was built out of the ruins. The whole area of the ancient temple was about 435 ft. long by 135 broad, in the centre of the dromos. At the present day the island is uninhabited. It is a favorite resort of travellers ascending to Nubia, and is one of the best of the remaining ruined sites of ancient Egypt.

Pliny, N. H., v., c. 29; Servius, *Æneid*, v. 154; Jones and Goury, *Views on the Nile;* Wilkinson, *Modern Egypt*, II. 295–303; Brugsch, *Reiseberichte aus Ægypten*, 256; Lepsius, *Reise*, 262.

PHILANTHROPY, n. *fĭl-ăn′thrō-pĭ* [Gr. *philos*, loved; *anthrōpos*, a man]: love of mankind—as opposed to *misanthropy*, hatred of mankind; universal benevolence; goodwill toward the whole human race. In the history of German school education it has acquired a special meaning. The influence of Rousseau was not less great on education than on politics, and was as visible in the pedagogues of Germany and Switzerland as in the men of the French Revolution. It is to the brilliant and one-sided advocacy, by the author of *Emile*, of a return to nature in social life and in the training of the young, that Basedow owed his novel and enthusiastic educationalism. For a brief notice of the institution, opened under his auspices at Dessau 1774, and called *Philanthropin*, see BASEDOW, JOHANN BERNHARD. Other establishments of the same kind were founded in different parts of Germany, but the only one still existing is Salzmann's Institute at Schnepfenthal, in Gotha, opened 1784. PHILANTHROPIC, a. *jĭl′ăn-thrŏp′ĭk*, or PHIL′ANTHROP′ICAL, a. *-ĭ-kăl*, loving mankind; possessing general benevolence. PHIL′ANTHROP′ICALLY, ad. *-lĭ*. PHILANTHROPIST, n. *jĭl-ăn′thrō-pĭst*, one who loves and seeks opportunities of doing good to mankind.

PHILATELY, n. *fĭ-lăt′ĕ-lĭ* [etym. doubtful; said to be from Gr. *philos*, loving, and *ateleia*, freedom from tax; the second element may be *telos*, a tax, and, regarding the stamp as the symbol of a tax or toll paid, *philately*, a love of stamps]: collecting of postage-stamps, especially those of foreign issues, as objects of curiosity or study. PHILAT′ELIST, n. *-lĭst*, one versed in philately; one who collects postage-stamps for curiosity or study.

PHILATORY, n. *fĭl′ă-tėr-ĭ* [Gr. *philos*, loved, loving]: a transparent reliquary placed horizontally upon four feet, and used to exhibit bones of saints, etc.

PHILBRICK, *fĭl'brĭk,* JOHN DUDLEY, LL.D., D.C.L.: educator: 1818, May 27—1886, Feb. 2; b. Deerfield, N. H. He graduated at Dartmouth 1842; taught in the Roxbury Latin School 1842-44, Boston High School 1844-47; and 1847 founded the Quincy Grammar School, which became a model for a system. He became principal of the Connecticut Normal School 1852, state supt. of education (Conn.) 1853; and 1857-74 and 1876-78 he was supt. of schools in Boston. He was commissioner from Mass. to international educational exhibitions at Vienna, Philadelphia, and Paris; and at the latter was decorated chevalier of the Legion of Honor 1878. He received the degree LL.D. from Bates College 1872; D.C.L. from St. Andrews Univ., Scotland, 1879. Dr. P. died at Danvers, Mass. He edited the *Connecticut State School Journal* and the *Massachusetts Teacher;* published lectures on *School Government* and *Characteristics of the True Teacher,* and several school textbooks.

PHILEMON, *fĭ-lē'mon:* abt. B.C. 360—B.C. 262; b. Soli in Cilicia: Greek comic poet. He became a resident of Athens at an early age and produced his first play abt. B.C. 330. P. was the first writer of the New Comedy in the order of time; in celebrity he was second only to Menander (q.v.), from whom in many dramatic competitions he carried away the palm of victory. He wrote about 90 plays, of which fragments only remain: these have been edited by Meineke, and pub. with the fragments of Menander (Berlin 1823) and in the same editor's *Fragmenta Comicorum Græcorum* (Berlin 1841); they have been edited also by Dindorf, and pub. in his ed. of Aristophanes (Paris 1838).

PHILEMON AND BAUCIS, *bâ'sĭs,* in Greek mythology, a couple celebrated for their faithful affection even in advanced age. Jupiter and Mercury traveling through Phrygia in a human form found no one willing to entertain them except this aged couple, who received them hospitably, washed their feet, set before them a rustic meal, and prepared a couch for their repose. The deities then took their hosts to a neighboring mountain, and when they looked behind them they saw their village sunk beneath the waves; but the cottage in which they had welcomed the pilgrims had become a magnificent temple. Jupiter promised also to fulfill all their wishes; but they only asked that they might die together as servants in that temple. At length, at a very advanced age, as they sat at the temple door they were at once transformed, Philemon into an oak, and Baucis into a linden. They were conscious of their change, which came gradually upon them, and while they were able to see and speak they took the most affectionate leave of each other. The trees were considered sacred.

PHILE'MON, EPISTLE OF PAUL TO: shortest of the four extant letters which the apostle wrote from Rome during his captivity. We either directly learn or legitimately infer, from its contents, that Philemon, who lived probably at Colossæ, was a man of wealth, head of a numerous household, and liberal to the poor. He had possessed a heathen slave, Onesimus, who had run away from him, after—it has been thought (verse 18)—robbing or defrauding him. Onesimus, however, coming to Rome, had been brought into contact with Paul, and converted to Christianity. At first the apostle thought to retain him as his personal attendant, for he was now, as he tells us (verse 9), 'Paul the aged;' but on further consideration, he resolved to send him back to his former master. The epistle is simply a brief letter, begging Philemon to pardon Onesimus, and to receive him 'not now as a servant, but above a servant, a brother beloved.' It evinces an exquisite tenderness and delicacy of feeling, with all that tact and subtlety of address by which Paul was wont to find his way into the innermost heart of men. The historical evidence of its authenticity is complete. Even Baur has remarked that modern criticism in assailing this particular book runs a greater risk of exposing itself to the imputation of an excessive distrust—a morbid sensibility to doubt and denial—than in questioning the claims of any other epistle ascribed to the apostle Paul.

PHILE'MON AND BAUCIS, *baw'sĭs:* in anc. mythology, according to a classic myth finely poetized by Ovid in his *Metamorphoses*, a married pair, remarkable for mutual love. Jupiter and Mercury, wandering through Phrygia in human form, were refused hospitality by every one, till this aged pair took them in, washed their feet, and gave them such humble fare as they could provide. On going away, the gods took the pair with them to a neighboring mountain, looking from which they saw their village covered with a flood, but their own cottage changed into a splendid temple. Jupiter permitted them to make any request they chose, but they asked only to be servants of his temple, and that they might die at the same time. When, accordingly, they were seated at the door of the temple, being now of great age, they were changed, Philemon into an oak, and Baucis into a linden. They felt the change taking place, and, as long as the power remained with them, looked tenderly on one another.

PHILHARMONIC, a. *fĭl'hâr-mŏn'ĭk* [F. *philharmonique* —from Gr. *philos*, loving; Gr. and L. *harmŏnĭa*, harmony of sound]: loving harmony; designating a society whose members are lovers of music or harmony.

PHILHELLENIST, n. *fĭl-hĕl'lĕn-ĭst* [Gr. *philĕō*, I love; *Hellēnes*, the Greeks]: a lover or friend of the Greeks, as against the Turks. PHILHELLENIC, a. *fĭl'hĕl-lĕn'ĭk*, pertaining to.

PHILIBEG: see FILLIBEG.

PHILIDOR, *fĭl'ĭ-dor*, Francois Andre Danican: great chess-player and writer, and musical composer: 1726, Sept. 7—1795, Aug. 24; b. Dreux, dept. of Eure-et-Loir, France; grandson of Michael Danican, who assumed the name of P. in addition to his family name of Danican, on account of his having equalled—as hautboyist to Louis XIII.—a celebrated player on the same instrument, named Filidori. His grandson, the famous P., studied music, and composed many comic operas, now forgotten. While residing in London—whither P. had fled on the outbreak of the revolution—1779, he set to music the 'Carmen Sæculare' of Horace; and this work is considered by many a masterpiece of musical art. P.'s modern reputation rests exclusively on his skill in the game of chess, whose principles he laid down with exceeding clearness. His passion for this game prompted him to visit Germany and Holland, where the most distinguished players, except those of Italy, were then found, in order to measure his strength with theirs. He visited England 1747, and there defeated Philip Stamina, the Arabian player, 8 games to 1 game, with 1 draw. From 1784 P. visited London annually, as guest of the Chess Club in St. James's st. He was one of the founders of the London Chess Club. In London 1777 he published *Analyse du Jeu des Eehecs* (Analysis of the Game of Chess), which has passed through an immense number of editions in various languages. He was noted for fine play of pawns, developing in a surprising manner the capacities of those usually underrated figures on the board. Another principle, then unique, seems to lie at the root of all P.'s games—to maintain and support carefully the pieces in the centre of the board; and rather than deviate from this principle, he rejects the opportunity for an effective and advantageous move. This scheme of the game, though now regarded by masters as sound in general, is deemed, if too strictly adhered to, to lead to a style lacking brilliancy and sometimes lacking force. He practiced with success the playing of games (usually three in number) blindfolded; but in this particular he has been far surpassed in recent times by Harrwitz, and more recently by Morphy and Paulsen. P. died in London.

PHILINTE, fĭ-lănt, a character in Molière's 'Misanthrope' (1666). His easy-going tolerance of the faults of his friends due to his recognition of the impossibility of reforming them makes him a strong contrast to the impatient hero Alceste.

PHILIP II.

PHILIP, *fil'ip*, II., King of Macedonia: father of Alexander the Great, and founder of the Macedonian empire (see MACEDONIA): B.C. 382–336 (reigned B.C. 359–336); b. at Pella; youngest son of Amyntas II. and Eurydice. At Thebes, whither he was taken as a hostage by Pelopidas, he spent part of his early life, employing his exile in studying the art of war, and the constitution and laws of the Greek states, as well as the literature and character of the people—pursuits which served him as admirable preparation when called to administer the government of the Macedonian kingdom. The assassination of his eldest brother, Alexander II., by Ptolemy Alorites, after a short reign of two years (B.C. 369–367), and the death of his second brother, Perdiccas III., in battle B.C. 360, placed him at the head of affairs in Macedonia B.C. 359, as guardian to his nephew Amyntas, still an infant. In a few months, P. made himself king, the rights of Amyntas being set aside by public interests that seemed imperative. Dangers soon beset him from without and from within. The Illyrians and other neighboring tribes assailed his kingdom on different sides; while two pretenders to the throne, urged on by the Athenians and Thracians, stirred up civil commotion. But foreign and domestic enemies soon disappeared before the decision, the energy, and the wise policy of the young king. Within a year he had secured the safety of his kingdom, and had gained for himself a dreaded name, though then only 24 years of age. Thenceforward his policy was one of aggression, and his every thought was directed to the extension of his empire and the spread of Macedonian influence. The Greek towns on the coast of Macedonia were the first objects of attack. After possessing himself of Amphipolis and Pydna, by means little consistent with the faith of treaties, he transferred to the Olynthians the city of Potidæa, which he had taken from the Athenians. In Thrace he captured the small town Crenides, which, under its new name, PHILIPPI (q.v.), soon acquired great wealth and fame, and ultimately became prominent in profane as well as in sacred history. The surrounding district was rich in gold mines, which brought great revenue to P. (probably about $1,200,000 annually), and supplied him plentifully with the means of paying his armies, of bribing traitorous Greeks, and of opening the gates of many cities, whose sieges might otherwise have cost the blood of thousands. Later he turned southward; and capturing Methone (in whose siege he lost an eye), he advanced into Thessaly, and ultimately to the Strait of Thermopylæ, which he did not attempt to force, as it was strongly guarded by the Athenians. Returning in to Macedonia, P. directed his arms against the Thracians, postponing his darling project to a more fitting occasion, which soon offered itself. After capturing all the towns of Chalcidice—the last the important city of Olynthus—he made peace with the Thracians, and next year with the Athenians, who had been at war with him in defense

of their allies the Olynthians. It was this siege of Olynthus by P. which called forth the Olynthiac orations of Demosthenes, still admired as efforts of oratorical genius of the very highest order. P. was now requested by the Thebans to interfere in the war ('the Sacred War') between them and the Phocians. He marched into Phocis, destroyed its cities, and sent as colonists to Thrace many of the inhabitants B.C. 346. The place of the Phocians in the Amphictyonic Council (q.v.) was transferred to P., and he was appointed, jointly with the Thebans and Thessalians, president of the Pythian games. His next step was to secure a footing in the Peloponnese, by espousing the cause of the Argives, Messenians, and others, against the Spartans. B.C. 339 the Amphictyonic Council declared war against the Locrians of Amphissa; and, in the following year, appointed P. commander-in-chief of their forces. The Athenians were alarmed at his approach into Greece in this capacity, and formed a league with the Thebans against him; but their united army was utterly defeated at the battle of Chæroneia B.C. 338, and all Greece was at his feet. He was now in a position to enter on the great dream of his later years —to invade the Persian empire, and revenge the injuries of Greece. Deputies from the different states of Greece assembled in congress at Corinth; and after resolving to make war on the Persian king, chose P. as leader of their armies. Preparations were in progress for this great expedition when he was suddenly cut off by the hand of the assassin Pausanias, at a festival celebrating the marriage of his daughter with Alexander of Epirus. A private grudge at P., for neglect to punish an insult offered to Pausanias by Attalus, was said to be the motive of the murderer, though suspicion is not lacking that the deed was done at the instigation of Alexander and his mother Olympias, who had retired from the court in disgust at P.'s marriage the year previous with Cleopatra, daughter of Attalus, one of his generals. P. was a man self-indulgent and sensual; he was faithless in observance of treaty obligations, and unscrupulous in pursuing his ends; but he had to deal with factions and faithless opponents, which may help to explain, though not to justify, his policy; while his clemency as a victor has won the admiration even of the virtuous Cicero, who pronounces him 'always great.' His force of character, his acuteness, fertility of invention, and eloquence, can scarcely be overrated. He was a lover of learning and a liberal patron of learned men.

PHILIP III. (ARRHIDÆUS), King of Macedon: died B.C. 317 (reigned B.C. 323–317); son of Philip II. and Philinna of Larissa, one of his many wives. He succeeded Alexander the Great, being elected king by the army at Babylon, at the death of Alexander. He was a youth of weak understanding, totally unfit for the duties of government. His wife Eurydice (daughter of Amyntas, son of Perdiccas III.), whom he married B.C. 322, endeavored, on their return to Macedonia, to oppose the measures

of Polysperchon and Olympias in support of the young Alexander, posthumous son of Alexander the Great and Roxana. But her army was defeated; she herself was taken prisoner, and, with her husband, was put to death.

PHILIP II., King of Spain: 1527, May 21—1598, Sep. 13 (reigned 1555–98); b. Valladolid; only son of Emperor Charles V. (q.v.) and Isabella of Portugal. He was brought up in Spain, and carefully educated under able tutors, becoming an accomplished linguist and mathematician, and a connoisseur in architecture and the fine arts. But all attempts to imbue him with the chivalric ideas of the time were futile. From his childhood he was distrustful and reserved; he invariably spoke with slowness and an air of deep reflection too marked to be genuine, and exhibited in his manners a *sang-froid* which even in his early years was rarely disturbed by ebullitions of passion. While still very young he was intrusted, under the direction of a council, with the government of Spain, and 1543 he espoused Mary of Portugal, who died three years afterward. In 1548 he went to join his father at Brussels, and there adopted and thenceforward retained the multitudinous equipage and minute and pompous etiquette of the late Burgundian court. While at Brussels, P. was presented to his future subjects, and was fully initiated into his father's policy, whose two chief items were maintenance and extension of absolute rule throughout his dominions, and support and propagation of the Rom. Cath. religion. In 1554 he married Mary Tudor, Queen of England, and to gain the support of that country to his political projects, and at the same time restore it to the Rom. Cath. pale, he laid aside his ordinarily cold and haughty demeanor, and labored to ingratiate himself with his wife's subjects, taking utmost care to avoid exciting their national jealousy of foreign influence. But his plans were discovered and frustrated; and this disappointment, combined with the annoyance to which he was subjected by the jealousy of his wife, prompted him to leave England (which he did forever), and return to Brussels 1555, Sep. In Oct. he became, by the abdication of his father, the most powerful potentate of Europe, having under his sway Spain, the Two Sicilies, the Milanese, the Low Countries, Franche Comté, Mexico, and Peru; his European territories being more fertile, and their inhabitants more wealthy and prosperous, than any others on the continent, while his army was the best disciplined, and headed by the greatest generals of the age. The treasury alone was deficient, drained by the enormous expenditure of his father's wars. P. was eager to begin the crusade in favor of Roman Catholicism; but he was compelled to postpone it by a league formed between France, the pope, and the sultan, to deprive him of his Italian dominions. He soon overcame his religious scruples at engaging in warfare with the pope, and intrusted the defense of the Sicilies to Alva (q.v.), who

speedily drove out the pope and the French, and conquered the papal territories; while P. himself vigorously prosecuted the war against France in the north, and defeated the French at St. Quentin (q.v.), 1557, Aug. 10, and at Gravelines, 1558, July 13. These reverses forced the French (the pope having already made a separate treaty) to agree to terms of peace at Château-Cambrésis, 1559, Apr. 2. P.'s wife, Queen Mary of England, was now dead; and after an unsuccessful attempt to obtain the hand of her successor, Queen Elizabeth, he espoused Isabella of France, and returned to Spain, where from this time he always resided. Before leaving the Low Countries, he solemnly promised to withdraw almost the whole of his Spanish troops who preyed on the peaceful Flemings, but he firmly refused to annul or modify the rigorous edicts of his father against heretics. His realm being now at peace, he resolved, as a necessary preliminary to his great proselytizing scheme, to replenish his treasury; a thing impossible without forced contributions, which at that time could be obtained only in those countries over which he held absolute rule—Spain and America. He therefore set about establishing absolute government in those of his states that were in possession of something like free institutions, and with this view sought to introduce the Inquisition into the Low Countries and Italy. But the introduction of this instrument of tyranny was successfully resisted in Naples and the Milanese; in Sicily its powers were so shackled as to render it harmless; but these failures only stimulated him the more to establish it in all its pride and power in the Low Countries. For a number of years it continued in vigorous action in that country; but the natural result was a formidable rebellion of all classes, Rom. Cath. and Prot., which was partially successful—the n. portion (the 'seven united provinces') establishing its independence 1579. In this conflict the resources of Spain were largely expended, and to replenish his treasury in the speediest manner possible, P. exacted enormous contributions from Spain, abolishing all special communal or provincial privileges and rights which might interfere with his actions, and suppressing all insurrection and discontent by force of arms or the Inquisition. During the first half of his reign he engaged in desultory warfare with the Barbary corsairs, who were supported by the Turks—the only memorable incident of which was the famous naval victory of Lepanto (q.v.), 1571, Sep. 16. In 1580, the direct male line of Portugal having become extinct, P. laid claim to the throne; and after the Duke of Alva had occupied the kingdom with an army, the Spanish monarch's title was recognized by the Portuguese estates. His enmity to England on account of the anti-Spanish policy of Queen Elizabeth incited him to attempt the conquest of that country, but his most formidable attempt failed signally: see ARMADA. After the accession of Catharine de' Medici to power, France and Spain drew closer the

bonds of amity which had previously subsisted between the two countries; but the refusal of Catharine to adopt P.'s plans for the wholesale slaughter of hereties produced a coolness in their relations. However, when Henry, King of Navarre, a Huguenot, became heir-presumptive to the throne, P. allied himself with the Guises and the other chiefs of the Rom. Cath. party who were in rebellion, and his obstinate persistence in these intrigues, after the cause of the Guises was shown to be hopeless, prompted Henry to declare war against him. The Spaniards had the worst of it, and P. was glad to conclude the treaty of Vervins, 1598, May 2. He died in the Escurial at Madrid, in the same year. It cannot be denied that P. was gifted with abilities; but he was a visionary, especially in politics, and engaged in so many grand enterprises at once as to overtask his resources without any profitable result. The Escurial (q.v.), which he built, is in its gloomy grandeur and its uselessness a monument to his character. He had industry, patience, persistency; but utterly lacked sagacity and political insight. No single kingdom in Europe could have long stood against him; but he was always at war with at least two at a time; and even the splendid opportunity which the extinction of the direct Capetian line 1589 gave him for uniting France, Spain, and Portugal in one great monarchy, could not restrain this unfortunate peculiarity. His fanatical enthusiasm for Rom. Catholicism, in which he was surpassed by no man who ever lived, and the zeal with which he persecuted all heretics through the Inquisition, combined with the odious tyranny of his secular government to degrade Spain, by breaking the proud and chivalrous spirit which had been the source of its pre-eminence among European nations; while his virulent persecutions of the industrious Moriscoes, and his oppressive exactions, put a stop to the commerce of the country. His whole economic policy was disastrous. By his fourth wife, Anne of Austria, he had a son, Philip III.

PHILIP V., King of Spain, founder of the Bourbon dynasty in that country: 1683, Dec. 19—1746, July 9 (reigned 1701–46); b. Versailles, France; second son of the Dauphin Louis (son of Louis XIV.) of France. The last king of Spain of the Hapsburg dynasty, Charles II., had successively promised the succession to the throne to Charles, archduke of Austria, great-grandson of Philip III. of Spain, and to P., then Duke of Anjou, son of the eldest sister of Charles II.; but becoming cognizant of a secret treaty which had been agreed to between England, France, and Holland for the partition of Spain, Charles II., to prevent the dismemberment of his kingdom, left by will the succession to P. of Anjou. France immediately seceded from the partition treaty, and, on the death of Charles II. 1700, P., who was the favorite candidate among the Spaniards, except those in the e. provinces, took possession of the kingdom 1701, Apr. 21; and, to gain over Savoy to his side and thus create a diversion

in Italy against Austria, he married Maria Louisa, daughter of Victor Amadeus. War almost immediately broke out between the rival claimants, Archduke Charles being supported by the 'grand alliance,' which included England, Austria, and Holland, and subsequently (1702, Jan.) Prussia, Denmark, and Hanover (1703, May), Portugal, and (1703, Oct.) Savoy: see SUCCESSION, WAR OF THE SPANISH. The fortune of war was mostly on the side of the allies; but France and Spain carried on the contest heroically, and, though at great sacrifices, the throne was secured to P. by the peace of Utrecht, 1713, Apr. 11. In the following year the queen died; and P. espoused Elizabeth Farnese of Parma, who immediately induced her husband to commit the reins of government to Alberoni (q.v.); in fact, so much was the weak-minded king under the influence of his able and energetic young wife, that he granted everything that she asked. 'He was,' says Sismondi, 'remarkable for good-nature, he had few faults and as few virtues, his sentiments were just and honorable, but he was wholly deficient in energy; he had no taste for anything beyond devotional exercises and the chase; he was made to be governed, and he was so all his life.' Alberoni's adventurous foreign policy, which at first succeeded in restoring the Spanish rule in Sicily and Sardinia, brought upon Spain the wrath of the Quadruple Alliance (France, England, Holland, and Austria), and war was averted only by Alberoni's dismissal; but his dismissal was produced really by his neglecting to further the queen's pet scheme of providing sovereignties in Italy for her sons, who seemed to have little chance of obtaining the throne of Spain. The strong bond of union which had hitherto subsisted between Spain and France was broken 1725 by the refusal of the regent of France to fulfil certain matrimonial agreements; but four years afterward the two countries joined with England and Holland against the emperor; and 1731 P. took measures to recover the old Spanish possessions in Italy. The war which followed at last satisfied the queen by giving the kingdom of the Two Sicilies to her son Charles (1736), but P., in attempting to obtain still greater advantages over Austria, was led into a war whose result he was destined not to see. He died at Madrid.

PHIL'IP, Apostle of the Lord Jesus: one of the twelve, mentioned fifth in the synoptical lists, and coupled with Bartholomew. Little is known of him except the few brief notices in the Gospels. He was of Bethsaida in Galilee, the city of Andrew and Peter. The Lord Jesus, the second day after his baptism, found Philip, and said to him, Follow me; Philip then found Nathanael (supposed the same as Bartholomew), and said, We have found him, of whom Moses in the law and the prophets, did write, Jesus of Nazareth. In reply to Nathanael's skepticism, Philip wisely answered, Come and see. It is fair to suppose that these two, and Peter and John, were, like Andrew, followers of John Baptist

and were prepared to accept the Messiah. Subsequently, at the feeding of the five thousand, the Lord seemed to test Philip's faith (Jn. vi. 5–7), but the question and answer do not necessarily imply lack of faith in the disciple. Neither is there any certain revelation of character in the incident touching the Hellenist proselytes (Jn. xii. 20–22). The rudimentary spiritual conceptions of the disciples before the resurrection, are shown in Philip's words at the Last supper: Lord, shew us the Father, and it sufficeth us. After the resurrection, he is mentioned as present at the election of Matthias to take the place or Judas. Eusebius distinguishes between Philip the apostle and Philip the evangelist, and attributes the conversion of the eunuch (Acts viii.) to the former. But other Christian Fathers do not so distinguish; hence the traditions of the after life of the apostle at Hierapolis in Phrygia and his burial there, remain unconfirmed. The *Acta Philippi* are fantastic and apocryphal. As a saint, Philip's day, with that of St. James the Less, is May 1; in the eastern church, Nov. 14.

PHILIP, *fĭl'ĭp*, KING. Sachem of Pokanoket: d. 1676, Aug. 12; son of Massasoit, the sachem of Pokanoket, who ruled over territory from Narragansett to Massachusetts. Massasoit kept peace with the English colonists till his death. He took his two eldest sons to Boston to have them given English names; the court called them Alexander and Philip. Alexander succeeded his father; and after two years, while being taken in custody to Boston, died, it was suspected by poison treacherously administered by the English. P. proved himself brave and able, and not without generosity. His principal village was at Mount Hope, a conical hill 300. ft. high, near Bristol, R. I. He was suspected of treachery by the English; and by 1670 he was convinced that the only chance of success against them was in Indian confederation. He gathered round him 8,000 to 10,000 warriors. In 1671 he was summoned to appear at Taunton, Mass., and went with 75 warriors. He professed submission, and consented to deliver up the muskets and ammunition of his tribe. In 1673 a Christian Indian, called Sausamon, fled to P. for protection; but returning after a time to the English, told them that P. was preparing for war. For this treachery Sausamon was waylaid and slain, and the English in revenge hanged three Indians. P. then (1675) sent his women and children to the Narragansetts for protection, and after warning some settlers with whom he was friendly, went on the war-path, and the infant colonies had to engage in the terrific struggle known as King Philip's war. 1675, June 24, he burned Swansea, but soon retreated before the rallied colonists. Gov. Winslow invaded the Narragansetts, and extorted a promise of neutrality. P. wasted the country and massacred the settlers from the Connecticut valley n. through Springfield, Mass., to Vermont. Brookfield, Deerfield, and Hadley were burned or surprised; though at Hadley the Indians were repulsed by the colonists under the aged

regicide William Goffe. No quarter was given or taken. Gov. Winslow 1675, Dec. 19, attacked the camp of the Narragansetts near Kingston, R. I., burned 500 wigwams, destroyed all their stores of winter provisions, and slew 600 warriors, and over 1,000 women and children. In the spring of 1676, P. retaliated by burning Weymouth, Groton, Medfield, Lancaster, Marlborough, in Mass., and Warwick and Providence, R. I. Philip's forces then dwindled, his wife and child were captured and sold into slavery, and he himself was shot in a midnight attack on his camp 1676, Aug. 12. His head was gibbeted at Plymouth, and his body quartered. The result of the war was the slaughter of over 600 colonists, and the almost complete extermination of the Wampanoag and Narragansett Indians.

PHIL'IP, THE MAGNANIMOUS, Landgrave of Hesse: 1504–67; b. Marburg. His father, William II. died 1509; and Philip succeeded him, his mother ruling as regent during her son's minority. In 1523 Philip married a daughter of George (nicknamed the Bearded), Duke of Saxony; and by her had four sons, who succeeded him in the landgraviate, it being by their father's will partitioned among them. Philip was among the first of the sovereign princes to cast in his lot with the Prot. Reformation, and as a member of the Smalkald League was defeated and taken prisoner by Emperor Charles V. 1546 at the battle of Mühlberg. His son-in-law, Maurice of Saxony, demanded, and obtained, his release after a brief captivity. It is a curious instance of how morality can be warped by religious prejudice that both the great Reformers Luther and Melanchthon allowed Philip's secret marriage to Margaret von der Saale, a Protestant, while his wife was still living—pronouncing the marriage with a Rom. Catholic adulterous.

PHILIPPE, *fe-lēp'*, II. (PHILIPPE AUGUSTE), King of France: 1165, Aug.—1223, July 14 (reigned 1180–1223); son of Louis VII. and Alix of Champagne. He was crowned 1179 during the life of his father, succeeded him 1180—being then again crowned, with his newly wedded wife; and proved one of the greatest monarchs of the Capetian dynasty. His marriage with Isabella of Hainault, descendant of the Carlovingians, established more fully the right of his family to the throne of France. He first made war on the Count of Flanders, to obtain the districts of Vermandois, Valois, Amienois, and Artois, which belonged to his wife; and, after various fortune, obtained Amienois and part of Vermandois at once, and the rest after the count's death 1185. By the advice of St. Bernard (q.v.) he rigorously punished heretics, despoiled the Jews, absolving their debtors of all obligations, excepting one-fifth, which he transferred to himself; put down with vigor the numerous bands of brigands and priest-haters who devastated the country and burned the churches and monasteries, compelling their chief leader, the Duke of Burgundy, to submit (1186) to

his authority—acts which gave him great popularity among his subjects. He sustained the sons of Henry II. of England in their rebellions against their father, and conquered, in conjunction with Richard Cœur-de-Lion, many of the English possessions in France. After the accession (1282) of Richard to the throne, P. and he set out together on the third crusade; but quarrelled while wintering in Sicily; and this dissension continuing, P., after a sojourn of $3\frac{1}{2}$ months in Syria, set out 1190, July 31, on his return to France, after taking a solemn oath to respect the integrity of Richard's dominions; but no sooner had he returned than he entered into an arrangement for the partition of Richard's territories in France with his unworthy brother John. Some acquisitions were made, but Richard's sudden return interfered with the calculations of the conspirators; and a war immediately commenced between the two monarchs, in which P. had to defend his territories at the same time from the English, and from the Counts of Champagne, Boulogne, Bretagne, and Hainault, who attacked them on all sides. To obtain money, he was obliged to rescind his edicts against the Jews; but the mediation of Pope Innocent put an end 1199, Jan. 13, to a war productive of no other result than exhaustion of the combatants. Richard of England died within two months; but war almost immediately recommenced with England, regarding the respective claims of King John of England and of his nephew Arthur of Bretagne to the French heritage of Richard Cœur-de-Lion, which consisted chiefly of Anjou, Maine, and Touraine. Arthur had applied to P. for aid, and the French king immediately responded by causing the young duke to be recognized in the above mentioned provinces; but a quarrel in which he became involved with the pope on account of his having divorced his second wife, Ingelburga of Denmark, to marry Agnes of Meran, a Tyrolese princess, compelled him to leave the English in possession a little time longer. The defeat, capture, and subsequent murder of Arthur, however, again brought P. into the field. The English provinces in France were attacked by the combined French and Bretons; Normandy and Poitou, with the three disputed provinces, were annexed to France; and the English dynasty in Bretagne dispossessed by a French one 1206, Oct. 26. 1211–14 P. was engaged in a war with King John of England and Emperor Otho of Germany, who had leagued themselves against him, in which he was on the whole successful. During the rest of his reign, P. was occupied in cosolidating his new possessions, and took no part either in the war with the Albigenses or that in England, though his son Louis (q.v.) went to England with an army. P. succeeded in establishing the unity of his dominions, and in emancipating the royal authority from the trammels of the papacy and clergy, and vindicated his sovereign authority over the clergy as his subjects, irrespective of the pope. His measures, without alienating the great feudal

lords, tended firmly to establish his authority over them, and to emancipate the larger towns from their sway. To increase the unity of the kingdom, and strengthen the central power, he established at Paris a chamber of 12 peers, six lay and six ecclesiastical, who almost always supported his plans, even against the court of Rome. Moreover he largely improved and embellished Paris, built many churches and other institutions, and encouraged commercial associations; he also fortified many of the chief towns, including the capital. He died at Mantes.

PHILIPPE IV. (PHILIPPE LE BEL, *lĕ bĕl*, or 'the Fair'), King of France; 1268–1314, Nov. 29 (reigned 1285–1314); b. Fontainebleau; son and successor of Philippe III., King of France, and Isabella of Aragon. By his marriage with Queen Joanna of Navarre, he obtained Navarre, Champagne, and Bric. For several years he contested with the Count of Flanders the possession of that country; and he seized Guienne from the English; but was, in the end, obliged to restore Guienne and Flanders beyond the Lys. The great events of P.'s reign were his war with the papacy and the extermination of the Knights Templars; the former had its origin in the attempt of the king to tax the clergy as well as the laity for the heavy expenses of his numerous wars. Boniface forbade the clergy to submit to taxation; while P., on his side, ordered that neither money nor valuables were to be exported, thus cutting off a main supply of papal revenue; and on the pope's legate insolently reprimanding him, he threw the legate into prison. P. then called an assembly of states, in which deputies of towns appeared—not for the first time; and obtained assurance of their support, even in case of excommunication and interdict. Boniface in turn assembled a council at Rome (1302), which supported his view, and the celebrated bull, *Unam Sanctam*, was promulgated. P. caused the bull to be publicly burned, and with the consent of the states-general confiscated the property of those prelates who had sided with the pope. Boniface now excommunicated him; but the king, nothing daunted, sent to Rome his gen., William de Nogaret, who seized and imprisoned the pope, who, though released after a few days by a popular rising, soon afterward died of grief and mortification. In 1304 P. obtained the elevation of one of his own creatures to the papal chair as Clement V., on condition of his residing at Avignon, and giving up the Knights Templars (q.v.). In accordance with this agreement, the Templars—against whom popular prejudice had been aroused by fanciful charges of horrible crimes—were seized (1306–14), and burned by hundreds, and their wealth appropriated by Philip. The grand master, Jacques de Molay, was burned 1314, Mar. 18; and when dying he summoned P. to appear with him within a year and a day, and the pope within 40 days, before the judgment-seat of God: strange was it that both the pope

and king died within the time mentioned, the king at Fontainebleau, from a hunting accident. P. during his whole reign steadily strove for suppression of feudalism and the introduction of the Roman law; but while thus increasing the power of the crown, and that of the third estate, his energy converted royalty, which had been protecting, kind, and popular to the mass of the people, into a hard, avaricious, and pitiless task-master. Under him the taxes were greatly increased, the Jews persecuted, and their property confiscated; and when these means were insufficient to satisfy P.'s avarice, he caused the coinage to be greatly debased.

PHILIPPE VI., OF VALOIS, King of France: 1293–1350, Aug. 22 (reigned 1328–1350); son of Charles of Valois, who was younger brother of Philippe IV. He succeeded to the regency of France on the death of Charles IV., the proclamation of a king being deferred on account of the pregnancy of Charles IV.'s widow; but on her giving birth to a daughter, P., according to a decision of the peers and notables, caused himself to be crowned king at Rheims 1328, May 29. His right to the throne was denied by Edward III. of England, grandson of Philippe IV., who declared that females, though themselves excluded by the Salic law, could transmit their rights to their children; and therefore insisted on the superiority of his own claim. P., however, was not only already crowned king, but he had the support of the people. His reign began gloriously; for marching into Flanders to support the count against his rebellious subjects, he wiped out the disgrace of Courtrai by vanquishing the Flemings at Cassel, 1328, Aug. 23. He was obliged to give up Navarre (q.v.), as the Salic law of succession did not apply to it, but he retained Champagne and Brie, paying for them a considerable annual stipend. P. seems to have had no settled plan of government, and no systematic political action; his acts were according to the whim of the hour, and were calculated mostly to gratify his own vanity and love of show. 1330–36, constant encroachments had been made on the English possessions in France, till at last Edward III.'s patience was exhausted; and, 1337, Aug. 21, he formally declared war. The commencement of this terrible hundred years' contest was made both in Guienne and Flanders; it was carried on languidly several years, the only prominent incident being the destruction of the French fleet off Sluys, 1340, June 24. In 1343, Mar., P. established the 'gabelle,' or monopoly of salt, a heavy percentage tax on all mercantile transactions. The constant round of fêtes and tournaments at court was never interrupted, even when the war had nearly exhausted the wealth of the country, for the money for them was immediately provided by some new tax or fresh confiscation. In 1346 Edward III. landed in Normandy, ravaged the whole country to the environs of Paris, and totally defeated P. at Crécy (q.v). A truce was then concluded; but the unfortunate king

dom had no sooner been released from war, than destruction in another and a more terrible form, that of the 'Black Death' (q.v.), threatened it. The wild extravagance of the court was nothing lessened by this visitation; but the financial embarrassments in which P. found himself, compelled him to agree to the passing of a law (1338) which gave to the assembly of the states the sole power of imposing taxes. He received Dauphiné in gift 1349, purchased Majorca from its king, and died the next year, neither loved nor respected. He was a despiser of learning, and a bigot.

PHILIPPE LE HARDI, *lėh hâr-dē'* (*Philip the Bold*), Duke of Burgundy: founder of the second and last ducal house of Burgundy—a famous and splendid ducal line rivalling that of many European dynasties: 1342, Jan. 15—1404, Apr. 27 (ruled 1363–1404); third son of Jean, King of France, and his wife Bonne of Luxemburg. He was present at the battle of Poitiers (1356), and showed such heroic courage, venturing his own life to save his father, as gained for him the sobriquet 'the Bold.' He shared his father's captivity in England; and returning to France 1360, received in reward of his bravery the duchy of Touraine, and subsequently (1363) that of Burgundy, being created at the same time the first peer of France. On the accession of his brother, Charles V., to the throne of France, P. had to resign Touraine; but, as compensation, obtained in marriage Margaret, heiress of Flanders. In 1372 he commanded the French army opposed to the English, and took many of the English possessions. In 1380 he exerted himself to suppress the sedition of the Flemish towns against their count, and succeeded with some of the malcontents; but the citizens of some of the populous places, especially Ghent, were possessed with such a fever of independence, that after many fruitless attempts to induce them to return to their allegiance, P. raised an army, and inflicted on them the bloody defeat of Rosbeck, 1382, Nov. 27, leaving 26,000 of them dead or wounded on the field. Flanders, the county of Burgundy, Artois, Rethel, and Nevers fell to him by the death of the count 1384; and he soon won the affection and esteem of his new subjects. Energy and wisdom characterized his rule; arts, manufactures, and commerce were encouraged, and his territory (a kingdom in extent) was one of the best governed in Europe. During the minority and subsequent imbecility of his nephew Charles VI. of France, he was obliged to take the helm of affairs, and preserve the state from insurrection and sedition within, and the attacks of the English without. He was on his way to repel an English attack on Flanders when he died at the chateau of Hall in Brabant, a little s.w. of Brussels.

PHILIPPE LE BON, *lèhbōng* (*Philip the Good*), Duke of Burgundy: 1396, June 13—1467, July 15 (ruled 1419–67); b. Dijon, the cap. of the duchy; son of Jean 'Sans-peur' by Margaret of Bavaria, and grandson of Philip the Bold. At the assassination of his father on the bridge of Montereau, at the instigation of the dauphin (afterward Charles VII.), P. succeeded to the duchy of Burgundy. Bent on avenging the murder of his father, he entered into offensive and defensive alliance with Henry V. of England at Arras 1419, at the same time recognizing him as the rightful regent of France, and heir to the throne after Charles VI.'s death. This agreement, which disregarded the Salic law, was sanctioned by the king, parliament, university, and states-general of France by the treaty of Troyes; but the dauphin declined to resign his rights, and took to arms; he was, however, defeated at Crevant 1423, and Verneuil 1424, and driven beyond the Loire. Some disputes with the English prompted P. to conclude a treaty with the king of France 1429; but the English, by ceding to P. the province of Champagne, and paying him a large sum of money, regained him to their side. At this time, by becoming heir to Brabant, Holland, Zealand, and the rest of the Low Countries, P. was at the head of the most flourishing and powerful realm in w. Europe; but though much more powerful than his superior, the king of France, he preferred to continue in nominal subjection. Smarting under some fresh insults of the English viceroy, and being strongly urged by the pope, he made a final peace (1435) with Charles, who gladly accepted it even on the hard conditions which P. prescribed. The English, in revenge, committed great havoc among the merchant navies of Flanders; whereupon P. declared war against them, and, in conjunction with the king of France, gradually expelled them from their French possessions. The imposition of taxes, which were necessarily heavy, excited a rebellion, headed, as usual, by the citizens of Ghent; but the duke inflicted on them a terrible defeat 1454, July, though he wept over a victory bought with the blood of 20,000 of his subjects. The latter part of his reign was filled with trouble caused by the quarrels between Charles VII. and his son, the dauphin Louis (afterwards Louis XI.), who had fled from his father's court, and sought shelter with P.; and who, after ascending the throne, far from showing gratitude, tried in the most dishonorable manner to injure his benefactor. P. died at Bruges, deeply lamented by his subjects. Under him, Burgundy was the most wealthy, prosperous, and tranquil state in Europe; its ruler was the most feared and admired sovereign of his time, and his court far surpassed in brilliancy those of his contemporaries. Knights and nobles from all parts of Europe flocked to his jousts and tournaments.

PHILIPPE EGALITÉ: see ORLEANS, LOUIS PHILIPPE JOSEPH, DUC D'.

PHILIPPEVILLE, *fē-lēp-vēl':* thriving town and seaport of Algeria, province of Constantine, 40 m. n.n.e. of the city of Constantine; on the Gulf of Stora, between Cape Boujaroun and Cape de Fer. It was laid out 1838 by Marshal Valée, on the ruins of the anc. Russicada, and is one of the prettiest towns in Algeria, and thoroughly French in its character. It is an important entrepôt of the commerce of e. Algeria; and the country in the vicinity is picturesque and fertile, producing grain, tobacco, cotton, flax, and fruits. It contains numerous public offices, a large hospital and dispensary, Rom Cath. and Prot. churches, public library and museum, theatre, etc. In the vicinity are quarries of the famous Filfila marble. A harbor has been constructed, including a pier and dock, affording shelter to small merchant ships. There are several establishments for curing fish, and there is trade in grain and in fabrics of native manufacture. P. is the chief station of the railway for the province of Constantine, and is connected by steamer with Marseille and Algiers. Pop., about 25,000.

PHILIPPI, *fĭ-lĭp'ī:* city of Macedonia, not far from the coast of the Ægean Sea; named after Philip II. of Macedon, who conquered it from Thrace (till which time it had been called Crenides or the 'Place of Fountains'), and who enlarged it because of the gold-mines in its neighborhood. Philip worked the mines so well, that he got from them about 1,000 talents a year (= probably $1,200,000). It is famous for the two battles (B.C. 42) between Antony and Octavianus on one side, and the republicans under Brutus and Cassius on the other. The first engagement was undecided; in the second, 20 days afterward, the republic finally perished. The apostle Paul founded a Christian church here A.D. 53, to which is addressed his Epistle to the Philippians (q v.). The ruins of the city still bear the name Philippi or Feliba.

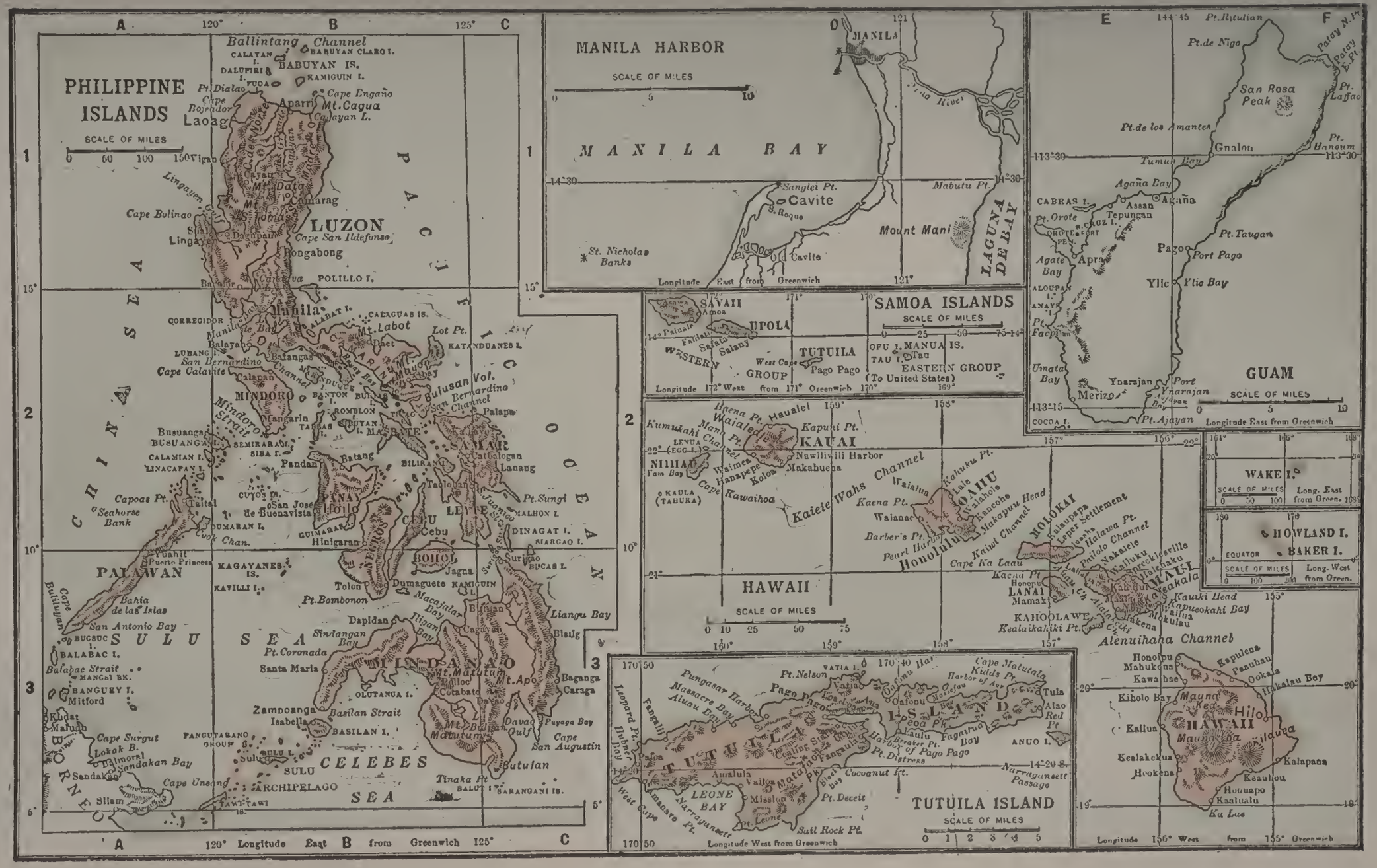
PHILIPPIANS, *fĭ-lĭp′pĭ-anz*, EPISTLE TO THE: one of the latest of the Pauline epistles in the New Test., written probably at Rome during the apostle's imprisonment (conjecturally about A.D. 63), and transmitted through Epaphroditus, apparently a pastor of the Philippian church, who had been sent to minister to the necessities of the apostle. The Philippian church was held in peculiar tenderness and affection by Paul. It was the first fruits of his evangelization in Europe; its members were singularly kind toward him; again and again, when he was laboring in other cities, e.g., Thessalonica and Corinth they sent him contributions that he might not be burdensome to his new converts; and now they had sent one of the brethren all the way to Rome with presents for him, knowing that he was in bonds, and suspecting—what was in fact the case—that he might be in sore straits for his daily bread.. His letter to them is deeply affecting. It contains not so much doctrinal matter, as a warm outpouring of his personal feelings toward his friends at Philippi, with some practical moral instruction peculiarly fitted to their needs. Its general character, though sounding forth from a prison, is that of a strain of triumph. The historical evidence in favor of the authenticity of the epistle is so strong, that it could hardly give way to any internal criticism; and the objections on that ground of merely vague conjecture, urged by Baur, Schwegler, and others of the Tübingen school, who regard it as a Gnostic composition of the 2d c., are regarded as preposterous even by many Biblical scholars who do not profess to be orthodox. Reference to it was made by Marcion, A.D. 140, it is quoted 177, in the letter of the churches of Lyons and Vienne; it is in the canonical lists of Eusebius, and the early councils, and is mentioned by the early fathers, e.g., Irenæus, Tertullian, and Clement of Alexandria. It has been well said that some of the original Philippian Christians might have been living when Polycarp wrote his letter to the Philippian church, A.D. 107, referring to Paul's epistle. Certainly Paul's cherished writing would be well known to those whom Polycarp addressed.

A passage of unusual doctrinal importance is ii. 5–7, as indicating Paul's Christology (comp. II Cor. viii. 9). This statement that Christ 'emptied himself' in his redemption of man, has given rise to interesting and profound discussion.—Valuable commentaries on this epistle are those of B. Weiss, Lightfoot, and Meyer.

PHILIPPIC, n. *fĭ-lĭp′ĭk* [after *Philip*, King of Macedon, in Greece]: originally one of the three orations or speeches of Demosthenes addressed to the Greeks against Philip. The name Philippics was afterward applied to Cicero's orations against the ambitious and dangerous designs of Mark Antony. It now designates any severe and violent invective, oral or written.

PHILIPPINE ISLANDS, or PHILIPPINES, *fĭl'ĭp-ĭn:* possession of the United States, ceded by Spain, 1898, Dec. 10, by Treaty of Paris, the small group of Cagayan Sulu and nine other small islands near Borneo being ceded later by special negotiations. They are the northernmost group of East Indian Islands; lie southeast of Asia (from which it is about 500 miles distant), south of Japan, and north of Borneo and Célebes; are bounded on the east by open Pacific, on the north and west by stormy China Sea, and on the south by Sea of Célebes; in long. 116° 40′—126° 34′ e. from Greenwich, and lat. 4° 41′—21° 10′ n. (thus lying entirely in the tropics); total length (north to south), 1,150 miles; total width (east to west), about 650 miles. Counting everything that appears as a separate island at high tide there are in all 3,141 islands, of which 1,668 are listed by name; total area, 115,026 square miles, but this is subject to correction. Luzon is the largest island, with area of 40,969 square miles; Mindanao ranks second, with 36,292 square miles; there are nine islands with areas between 1,000 and 10,000 square miles (namely, Sámar, 5,031; Negros, 4,881; Panay, 4,611; Paragua or Palawan, 4,027; Mindoro, 3,851; Leyte, 2,722; Cebú, 1,762; Bohol, 1,441; Masbate, 1,236); 20, with areas between 100 and 1,000 square miles; 73, with areas between 10 and 100 square miles; 262, with areas between 1 and 10 square miles; and the rest (2,775), with less than one square mile each. The islands fall into the following divisions: at the extreme north the Babuyan and Batan groups, which are little more than rocky islets; the large irregular island of Luzón, lying in lon. 119° 40′—124° 10′ e. and lat. 12° 30′—18° 40′ n., with an extreme length of 530 miles, and maximum and minimum of 140 miles and 8 miles respectively; south of Luzón, and extending to Mindanao, the Visayas Islands (the principal ones of which are enumerated above—Mindoro and Paragua not belonging to this group); west of these (the most westerly island of consequence), the long narrow, and mountainous island of Paragua, which extends from northeast to southwest for a distance of 225 miles, with an average width of about 15 miles; Mindanao, south of the Visayan Islands, in long. 128° 5′—132° 15′ e., and lat. 5° 40′—9° 50′ n., a very mountainous and irregular island, where the volcanic action had been especially marked; the Sulu Archipelago, extending southwest from Zamboanga Prov. in east Mindanao, the largest island of which is Jolo, in lat. 6° n. with an area of 326 square miles; and the Tawi Tawi group, the most southern of the Philippines, of which Tawi Tawi, the largest of the group has an area of 232 square miles. Pop. (census of 1903), 7,635,426 (both civilized and uncivilized); capital and chief city, Manila (q. v.), located on Manila Bay.

Topography and Structure, and Hydrography.—The Philippines were probably once a part of the Asiatic


PHILIPPINE ISLANDS
SCALE OF MILES
0 50 100 150
Ballintang Channel
BABUYAN IS.
Cape Engaño
Mt. Cagua
Aparri
Laoag
Cape Bojeador
Pt. Dialao
Mt. Data
Cape Bolinao
LUZON
Cape San Ildefonso
Dagupan
Lingayen
Bongabong
POLILLO I.
Manila
CORREGIDOR
CALAGUAS IS.
Mt. Labot
Lot Pt.
KATANDUANES I.
Batangas
San Bernardino Channel
Cape Calavite
MINDORO
Mindoro Strait
Mangarin
Busuanga
CALAMIAN I.
LINACAPAN I.
Capoas Pt.
Seahorse Bank
Taitai
Puerto Princesa
Cuyos Pt.
San Jose de Buenavista
Pandan
Batang
SAMAR
Catbalogan
Lanang
Pt. Sungi
MALHON I.
DINAGAT I.
SIARGAO I.
PANAY
Iloilo
LEYTE
CEBU
Cebu
BOHOL
Jagna
Surigao
BUCAS I.
Tolon
Dumaguete
KAMIGUIN
Pt. Bombonon
Macajalar Bay
Liangu Bay
Bislig
Dapidan
Iligan Bay
Sindangan Bay
Pt. Coronada
Santa Maria
MINDANAO
Mt. Matutum
Mt. Apo
Cotabato
Davao Gulf
Baganga
Caraga
Puyaga Bay
Cape San Augustin
Zamboanga
Isabella
Basilan Strait
BASILAN I.
PANGUTARAN GROUP
SULU I.
Cape Surgut
Lokak B.
Malumpal
Sandakan Bay
Sandakan
Cape Unsang
Sliam
TAWI-TAWI
SULU ARCHIPELAGO
Tinaka Pt.
BALUT I.
SARANGANI IS.
PALAWAN
Bahia de las Islas
San Antonio Bay
BUGSUC I.
BALABAC I.
Bulabac Strait
MANGSI BK.
BANGUEY I.
Mitford
Khdat
Maluda
BORNEO
CHINA SEA
SULU SEA
CELEBES SEA
PACIFIC OCEAN
A
B
C
120° Longitude East from Greenwich 125°
MANILA HARBOR
SCALE OF MILES
0 5 10
MANILA
Pasig River
MANILA BAY
Sanglei Pt.
Cavite
Mabutu Pt.
Mount Mani
LAGUNA DE BAY
St. Nicholas Banks
Longitude East from Greenwich
SAMOA ISLANDS
SCALE OF MILES
0 25 50 75
SAVAII
Samoa
UPOLA
Faiali
Safata
Salani
TUTUILA
West Cape
Pago Pago
WESTERN GROUP
EASTERN GROUP
(To United States)
OFU I.
MANUA IS.
TAU I.
Longitude 172° West from 171° Greenwich 170°
GUAM
SCALE OF MILES
0 5 10
Pt. Ritidian
Pt. de Nigo
San Rosa Peak
Pt. Lafac
Pt. de los Amantes
Gnalou
Pt. Hanoum
Tumon Bay
Agaña Bay
Agaña
CABRAS I.
Assan
Tepungan
Pt. Orote
Agate Bay
Apra
Pt. Taugan
Pago
Port Pago
Ylic
Ylic Bay
Umatac Bay
Merizo
Ynarajan
Port Ynarajan
Pt. Ajayan
COCOS I.
Longitude East from Greenwich
KAUAI
Haena Pt.
Haualei
Waialeale
Kapuni Pt.
Kumukahi Channel
Mana Pt.
NIIHAU
Nawiliwili Harbor
Waimea
Hanapepe
Kolos
Makahuena
Cape Kawaihoa
KAULA (TAHURA)
Kaiete Wahs Channel
Kaluku Pt.
Waialua
Haiee
OAHU
Waialua
Kaena Pt.
Waianae
Barber's Pt.
Pearl Harbor
Honolulu
Waikiki
Kaneohe
Makapuu Head
Kaiwi Channel
Cape Ka Laau
MOLOKAI
Kalaupapa
Leper Settlement
Halawa Pt.
Pailolo Channel
Nakalele
Kaluku
Spreckelsville
Maalaehaku
MAUI
Kaeakala
Kauiki Head
Kapueokahi Bay
Hana
Mokulau
LANAI
Mamaki
KAHOOLAWE
Kealaikahiki Pt.
Alenuihaha Channel
HAWAII
SCALE OF MILES
0 10 25 50 75
WAKE I.
SCALE OF MILES
0 50 100
Long. East from Green.
HOWLAND I.
EQUATOR
BAKER I.
SCALE OF MILES
0 100 200
Long. West from Green.
TUTUILA ISLAND
SCALE OF MILES
0 1 2 3 4 5
Pt. Nelson
Vatia
Pago Pago
Pungasar Harbor
Massacre Bay
Aluau Bay
Cape Matutala
Kidds Pt.
Harbor of Asu
Tula
Alao
Red Pt.
ANUO I.
Olosega
Ofotu
Matafao
ISLAND
Leopard Pt.
Fangalili
Huluhulu Pt.
Faga Pk.
Faga Beach
Faga Pt.
Fagaitua Bay
Laulu
Breaker Pt.
Harbor of Pago Pago
Pt. Distress
Calling Station
Matafao Peak
Fagasa Bay
Cocoanut Pt.
Narragansett Passage
Amalulu
Vailoa
Pt. Deceit
LEONE BAY
Mission
Pt. Leone
Sail Rock Pt.
West Cape
Nunavo Pt.
Honoipu
Mahukona
Kawaihae
Kiholo Bay
Kailua
Kealakekua
Hookena
Mauna Kea
Hilo
Mauna Loa
HAWAII
Kapulena
Paauhau
Ookala
Hakalau Bay
Kalapana
Keauhou
Honuapo
Kaalualu
Ka Lae
Longitude West from Greenwich

continent, but must have been separated from it before the end of the Tertiary epoch. They connect with Borneo and Célebes with three partially submerged isthmuses. In geologic structure they are similar, and in general of volcanic origin. The great upheavel came in the Eocene age of the Tertiary epoch, after the vegetable matter that had collected in the swamps and shallow seas had been converted into lignite. There is considerable limestone, and the living coral animals are still at work near most of the islands. A state of unrest still prevails, and earthquakes are common, while there are at least a dozen volcanoes that have been active within historic times, and many others that are quiet or extinct. In general shape, the islands may be compared to a triangle with the most acute island at the extreme north and the east and west legs represented respectively by the Visayan Islands and Mindanao, and Paragua and its adjacent islands, the two legs enclosing the Sulu Sea. The general extension is from north to south, though some of the islands extend northeast and southwest, and others west of north and east of south. The total coastline is 11,444 miles, or more than double that of the United States proper. The east or Pacific coast is but slightly indented, but there are many harbors on the west, although dangerous of entrance because of the coral reefs. Many currents, shot in among the islands from the great Japanese current, make navigation dangerous for sailing vessels; while the tides are irregular. The entire archipelago is distinctly mountainous, the ranges in general extending along the greater axis of each island. Luzón has three ranges, the Sierra Madre, the Carballos Sur, and the Caraballos Occidentales this last being broken into the three divisions of Cordillera Norte, Central, and Sur. The highest peaks in the islands are: Apo, in Mindanao, 10,311 ft.; Halcón, in Mindoro, 8,800 ft.; Canlaón, in Negros, 8,192 ft.; Mayōn (an active volcano, with perhaps the most beautiful cone in the world), in Luzón 7,916 ft.; Banájao, in Luzón, 7,382 ft.; Dahá, 7,364 ft.; Santo Tomás, in Luzón, 7,298 ft.; and Tantaguan, in Luzón, 6,382 ft. Others range up to slightly over a mile in height. The largest rivers are the Cagayán, of north Luzón, and the Rio Grande and Agusan of Mindanao, each about 200 miles in length and all carrying considerable water, even during the low season. Among other rivers may be mentioned the Agno, Pampango, Abra and Pásig, all of Luzón. None of the other rivers are important for navigation. The stream beds show considerable erosion, and have high, steep banks, as one would expect in a volcanic country. The most important lakes are Bay, Bombon or Taal, and Bató, in Luzón, the first of which is drained by the Pásig, while Taal contains on a small island the celebrated and still active volcano of Taal; and Lanao, Liguasan, Bulúan, Maynit Dagun and Linao, in Mindanao, some of which are marshy and have innumerable bayous.

Meteorology.—The climate is tropical, but between different sections rather wide divergences are noted. The Batan Islands, Benguet Prov., in Luzón, and parts of the Visayas and Mindanao are the coolest locations. There are three seasons—temperate (Nov.-Feb., with a monthly mean temperature of 77°–79.7° F.); hot (Apr.-June, with monthly mean temperature of 81.5°–83°); and intermediate (Mar. and July-Oct., with temperatures between 80° and 81.5°). January is the mildest month. Manila has a mean average temperature of about 80° F. The highest temperature recorded at Manila was 100° F. for May, 1889, and the lowest, 61° for Feb., 1888. The most oppressive heat comes in the middle of the day. The high mean temperature (with the comparatively small variation) and the great amount of humidity always present are the factors that make the Philippines in most parts a trying place of habitation to the European or American. The month of greatest humidity is September and the lowest, April. As in most tropical countries, the year is divided roughly into two parts—the wet and dry seasons. The dry season lasts from November to May (inclusive), and the wet from June to October. This applies only to the interior and the west coast, for on the east Pacific coast, the reversal of this is about true. Rainy days in Manila average considerably less than 200. The rainfall at Manila for 1867 was 117 in., and for 1891, 105 in., while in 1874 it was but 47 in. The average rainfall for Manila is 75.5 in., but in Albay Prov. it is as high as 116. Destructive droughts sometimes occur. The Philippines have no monsoons properly so-called. The prevailing winds at Manila are the southwest for May-Oct., the north for Nov.-Feb., and the east for Mar. and Apr. The cloudiest month is Aug., and the clearest, Mar. The islands are frequently visited by *baguios* or typhoons, which cause great loss of life and property. Since 1879, these have been accurately forecasted by the Jesuits in charge of the meteorological observatory at Manila, from which untold good has resulted. Unsanitary conditions are not the best, although since American occupation they have been greatly bettered. Most of the usual tropical diseases are found. Leprosy, beri-beri, smallpox, cholera and the bubonic plague have wrought havoc. Dysentery and malarial fever are, perhaps, the most common. The government laboratories at Manila are doing most efficient work, and it is being demonstrated that the American may, with the proper precautions, live in the Philippines.

Vegetable Life and Agriculture.—The Philippines are remarkably rich in tropical vegetation, the mountains even being clad with forests to the very summits. There are many kinds of fruit, palm, nut and timber trees. Oranges, lemons, mangoes bananas, durions and many other fruits abound. The wealth in palm trees is extraordinary, among the most important being the areca or

bonga, and the cocoanut, from the first of which comes the nut used in the preparation of betel, while from the second can be obtained clothing, food and shelter, and, in fact, all the necessities of life. The bamboo is found in many species, and is one of the greatest boons in the islands. From the nipa palm the natives obtain thatch for their houses. Timber trees form one of the greatest future resources of the islands. Many of them are of prime value because of their hardness or other qualities, and as roads are built, these will become available for market. Oils, gums and resins, and medicines are among the valuable products of trees and plants. Of fiber plants alone the islands have over 300 varieties the most important of which is the abacá or *musa tcxtilis*, a species of banana. From this plant comes the manila hemp of commerce, which forms more than half of the exports of the islands. As this plant grows naturally nowhere else in the world, the Philippines thus have a monopoly of its trade, the development of which is yet in its infancy. With the invention of a good stripping machine, much of the fiber that is now lost by the slow hand method of stripping will be saved, while the waste, it is thought, can be profitably made into paper. This fiber has been for centuries woven into the cloth called by the natives *sinamay*, and, mixed with the pineapple fiber and silk, it is woven into the delicate *husi*. From the pineapple fiber is woven the beautiful piña cloth. Maguey, which was early introduced from Mexico, grows abundantly. Various kinds of rattans furnish strong fibers for the coarser work. Ramie or China grass, and many other grasses, furnish good fibers. From the grass called *cogon*, it is probable that a good grade of paper can be woven. Sugar is an important product, especially in the islands of Negros and Panay, where the industry is slowly recovering from the ravages of war and nature. Coffee and cacao (the latter introduced from Mexico), and indigo, grow readily, and are of excellent quality, although for the last few years the coffee has been attacked by a destructive borer. Rice forms one of the staple products of the islands, but owing to the loss of the greater part of their carabaos by rinderpest, cultivation had for some years been much below the normal, and it has been necessary to import much of this valuable grain, although conditions are steadily reassuming their natural tone. Tobacco, which was transplanted from Mexico in the 16th century, grows in many places, especially in the rich valley of the Cagayán in Luzón. Most of the European grains, and maize can be grown, as well as many of the vegetables. The camote or sweet potato, is found throughout the islands. Agriculture has always been and must continue to be the chief source of wealth in the islands. Better methods and better implements will improve the output many times; while a proper spirit shown by the American government in regard to the tariff will tend to place the agricultural industries on a firm footing.

Animal Life.—The peculiar forms of animal life found in the Philippines may be due to their separation from Asia before the end of the Tertiary age. Zoologically considered, they are not identical with their political territory, for Balabac, Paragua and the Calamianes resemble Borneo rather than their own group. While extraordinarily rich in bird life, the Philippines are poor in mammals. There is a total lack of ferocious, carniverous animals, the latter being represented by a small wildcat, two species of civet cats and an animal called the binorang. Among game animals are found many kinds of deer and some antelope. In Mindoro alone is found the small, timid buffalo, called the timarau, which cannot be domesticated. There are many wild hogs which cross freely with the domestic variety. Among the rodents are rats, mice, squirrels and shrews. Many species of bats exist, among them the large fruit-eating bat, which is valued for its fur and flesh. In their caves are extensive deposits of Iguano, which promise good returns if worked. Monkeys are limited to one species, though many varieties have been claimed by numerous writers. Domestic animals are represented by the horse (a small breed said to be descended from Andalusian Chinese and Bornean breeds); sheep and goats (imported from Mexico and Spain); swine; common cattle (though but comparatively few), and the dog. The most useful of all the domestic beasts is the water buffalo or carabao, on which the natives depend in great part for the cultivation of their rice. It requires frequent mud-baths, and is extremely subject to disease, especially the rinderpest, which in the past few years has swept off most of those in the islands. Carabao milk is used, although, like the flesh of the carabao, it is strong. Wild carabaos are found in some of the islands, but they can be readily domesticated. About 600 species of birds are known to exist in the Philippines, of which 325 are peculiar to those islands. The bird of paradise, humming bird and lyre bird are not found, notwithstanding the assertions of some writers. The mound builder or tabón, which buries its eggs in the sand, is one of the most interesting. The birds examined include pigeons and doves, snipe plover, turnstones, herons, bittern, ducks and other water birds, and various kinds of parrots and paroquets. Most dangerous among reptiles are the huge crocodiles that infest many of the rivers. The largest snake is the python or saua, which sometimes attains a length of 18 feet, and while generally harmless to man has been known to attack human beings. They are often tamed and are extremely useful in destroying rats. There are many venemous serpents, among them the cobra, although death from snake bite is comparatively rare. Land and sea turtles are abundant, and the shell of the tortoise is an important article of commerce. Fish, of which there are many species, is an important article of food. Land mollusks, mostly snails, are plentiful. Several species

of oysters are found, among them the true pearl oyster in the Sulu Sea. The land teems with spiders, flies, mosquitoes and other troublesome insects. The white ant and the locust are among the worst pests of the islands, and the natives are now only slowly recovering from the recent ravages of the last-named. There are three species of honey bee, whose wax is an important article of trade; and many kinds of wasps. Scorpions, centipedes, lizards and leeches are numerous.

Mineral Resources.—The most useful mineral deposits are the great beds of lignite, especially those of Cebú and Batan Islands, where the coal appears superior to the Japanese coal, and compares favorably with Washington and Australia lignite. The coal in the two above islands contains less sulphur and water than other deposits in the Philippines. Associated with the coal is sometimes found petroleum which is rich in paraffin. Gold and copper have been worked for centuries, the former generally by washing, and the latter by a smelting process taught the Igorots by the Chinese. The richest deposits of both probably occur in the Igorot country, but gold is found in many of the islands. While the gold is mostly detrital, there are some quartz veins that can be advantageously worked by stamp mills. Lead, silver, zinc and platinum are found in very small quantities. Manganese has been reported as existing in Masbate. The existence of mercury has also been often reported but the truth of this has not yet been demonstrated. There are traces of antimony and tin. Good deposits of hematite and magnetite iron are found in Luzón, where iron has been smelted for many years. This iron is said to be suitable for bessemer steel. Limestone occurs in great abundance and can be used as a flux. Kaolin and red clay for pottery, a good fire clay, gypsum and rock salt occur in quantity. A beautiful variegated marble is quarried in Romblón, while durable building stone is common. The discovery of asbestos has been reported recently. Asphalt is found in Luzón. Niter may be obtained from the guano deposits in the bat caves. Sulphur is abundant. A good lithographic stone has been reported from Rizal province. Mineral springs, of many kinds, abound in all parts. The only precious gem frequently found is the opal. Since American occupation, mining, prospecting and assaying have engaged attention to a greater extent than during all the past centuries. Much government attention has been given to the formation of a suitable mining law. More and better machinery is being constantly installed, and the mining industry is rapidly being placed upon a paying basis.

Ethnology, Population, Religion, and Education.—At the time of the discovery, two distinct races were found: the dwarfish, savage negritos, who were the aborigines, and of whom but about 20 000 or 30,000 remain; and the various Malay tribes, who had migrated in successive

waves from the more eastern and southern islands of the East Indian Archipelago. Some intermixture of blood took place between the two races, as is witnessed by various hill tribes of Luzón and Mindanao, the predominant feature and characteristics in such mixtures, however, always bring the Malay. The Chinese and Japanese, contrary to many reports, never formed a tribe by intermixture with the Malays. The Chinese mestizos, or half castes, of whom there are many in the islands, are not a race or tribe. The Igorots, the wild pagan tribes of Mindanao, and the Moros, are all Malayan, as well as the eight civilized Filipino tribes. The term 'Filipino' is applied correctly only to members of the eight Christian tribes, namely Tagálogs, Ilokans, Pangasinans, Pampangos, Bicols, Zambals, Cagayán—all of Luzón, and the Visayans, of the Visayan Islands. All other are spoken of as the wild tribes or Moros. At the time of the discovery, all the inhabitants probably numbered scarcely more than 500,000. In the 387 years since, the number has risen to about 8,000,000, of whom about 7,000,000 are civilized while the wild numbered (1903), about 650,000, of whom the Moros numbered almost 280,000. The present number by tribes of the Filipinos (of course allowing for errors in the census) are as follows: Visayans, 3,219,030; Tagálogs, 1,460,695; Ilokans, 803,942; Bicols, 566 365; Pangasinans, 343,686; Pampangos, 280,984; Cagayáns, 159,642; Zambals, 48,823. There are a few Europeans, Americans, Chinese, Japanese and other Oriental peoples. Spaniards have intermarried with the Filipinos to form a small class of Spanish mestizos. They, together with the Chinese mestizos, form the wealthiest and, perhaps most influential class. The ancient language of the negritos has been forgotten, and they use that of their invaders. The many languages or dialects of the Malayan tribes are derived from the ancient Malay. The present religion of the pagan tribes corresponds in great measure to that of the ancestors of the present Christian tribes or Filipinos. This was a sort of spirit and ancestor worship, in which good and bad omens figured considerably. Much of it still lives in the common folklore of the people, in their stories of witches and goblins. Through contact with the people of Borneo or other islands, or through migration, Mohammedanism had secured a firm foothold in Mindanao, Joló, and some other islands at the time of Magellan's discovery. The faith of the prophet had, indeed, crept up as far as Manila, but with the permanent occupation of Luzón in 1571, this was speedily, in that quarter, replaced by the Christian religion, which spread with amazing rapidity among the people. The conversion was effected first through the Augustinians, who accompanied Legazpi on his expedition in 1564. The Franciscans arrived in 1577, the Jesuits in 1580, the Dominicans in 1582 and the Recollects in 1606. In the 19th century a few Capuchins,

Benedictines and fathers of St. Vincent de Paul established themselves in the islands. The hospital order of St. John of God was established in the 17th century, and did magnificent work. The islands at first comprehended a bishopric subordinate to Mexico, with Manila as the seat of the see. However, in 1595, Manila was made the seat of an archbishopric, and the three suffragan sees of Cebú, Nueva Segovia and Nueva Cácerea were established. In 1865 the bishopric of Jaro was added. The islands owe much to the friars, but also the latter proved a stumbling-block to progress, and refused to advance with changing conditions, and were a great factor in the insurrection of 1896, which, of course was due partly to political conditions. One of the restrictions felt most keenly by the Filipinos was the subordinate places conceded to the native secular priesthood, and their subservience to the regulars, who acted, in many instances, as parish priests. With the civil government the orders had many tilts over the ecclesiastical patronage, which belonged to Spain by virtue of grants from Pope Alexander VI. It is in large measure due to the feeling of resentment on the part of the native clergy that the Filipino Independent Church has been instituted (1902) under the Iloken priest, Gregorio Aglípay, as bishop. This church, which numbers in its ranks many of the independent party in politics, is said to have about 2,000,000 adherents. The ritual book of the church has recently been published; and it is to be noted that much attention has been paid to the higher criticism of the Bible, and that the organization and beliefs differ in many ways from those of the Roman Church, one startling innovation being permission to the priests to marry. Since American occupation, the friar lands have been purchased, and there are now comparatively few friars in the islands. The Jesuits who are not friars, still maintain charge of their teaching, and their control of the Manila Observatory. Various Protestant sects have begun mission work among the natives, and are working in harmony with the Aglípay Church. Their presence will doubtless stimulate the Roman Church to live up to its best ideals, in order that it may not lose any of its ground.

On the arrival of the Europeans, the Malayan natives were found to be in possession of a written alphabet, derived probably from the Arabic, and the knowledge of reading and writing is said to have been common. The Spanish attempts at education date almost from the beginning of permanent occupation. The first regular school founded was that of San José, and which was established on a lay foundation through the agency of the Jesuits, who had the school in charge. This is the college which has played so important a part in the courts since American occupation, and which by recent negotiations with Archbishop Harty, is left in control of the Dominican Order, who have administered

it since shortly after the expulsion of the Jesuits, in 1568. The Dominican College of Santo Tomás was founded in 1619 and became a university in 1645. Instruction therein, although not of the best, was continuous throughout the Spanish regime, and the university is still maintained. The college of San Juan de Letran, founded under the name of San Pedro y San Pablo in 1640, soon came into charge of the Dominicans, who have maintained it ever since. Although there were various sporadic attempts to establish conciliar seminaries, no real success was attained until the arrival of the Paulist fathers in 1862. The year 1859 marks an epoch in Philippine education. In that year the Jesuits returned to the islands, and were given charge of the Ateneo Municipal (Municipal Atheneum) in Manila, where they introduced newer methods and better teaching that put new life into the community. The first successful governmental attempts to better education were those of 1863, Dec. 20, when the decrees establishing primary and normal schools were issued. Thitherto there had been no public schools, and education had been almost entirely in the hands of the friars. Even now the attempt to take control of education from them was unsuccessful and they maintained their hold in educational matters to the end of Spanish rule. Many educational decrees of the government were issued after 1863, but in great part they remained dead letters, or their intended effect was nullified; and the course of studies pursued in the public schools was extremely poor, and consisted principally of drill in the catechism. The Moret decree of 1870 was an attempt to secularize education, but it failed utterly. So likewise did the design of the Spanish government, pushed with greater or less warmth at different epochs throughout their occupation, of teaching the Spanish language to the natives. There were, in addition to the above institutions and schools, numerous schools and academies (governmental and private) of a professional or industrial nature, some of which furnished good instruction. Since American occupation, the system of the public schools in the United States has been introduced, and has proven a great success. The Filipinos are eager to learn and avail themselves readily of their opportunity. Teaching is in the English language, but it is yet too early to dogmatize concerning its usefulness, though much can be said in favor of this method of instruction. The Philippine government maintains about 200 Filipino students in the United States and the Philippine assembly has recently made a generous appropriation for educational purposes in the coming year. The effort is wisely being made to place the education as far as possible in the hands of the Filipinos themselves.

Commerce and Revenues.—The Chinese had traded for centuries in a somewhat haphazard way among the Philippine Islands, and on the coming of the Spaniards, had

been quick to enter into trade relations with them, and through them, with Mexico and South America. The Seville and Cadiz merchants, who had the monopoly of trade with America, alarmed at the greater cheapness of the Chinese merchandise, and fearful lest their own profits suffer, protested violently against the Chinese trade, and secured restrictions on the freedom of trade enjoyed in the Philippines for a few years. Trade with the Philippines was limited to New Spain, and the Chinese merchandise might not even be shipped from the latter country to South America. But one galleon was allowed to sail annually from Manila, with a cargo valued at 250,000 pesos. The money brought back from Mexico on the return trip was not to exceed 500,000 pesos. These figures were later raised to 300,000 and 600,000 pesos respectively, and still later to 500,000 and 1,000,000 pesos. These restrictions were, however, practically a dead letter, for smuggling was almost openly allowed, and corruption was common among public officials. The last galleon left Manila in 1811 and returned in 1815, after which trade was direct to Spanish ports, on account of the revolt of Mexico. Profits were immense, rising as high as 175 percent. The lading space of the galleons was divided into sections, the unit of measurement being a bale about 2½ ft. by 1¼ ft. by 2 ft. *Boletas*, as the right to ship was called, were divided into thirds or sixths, and were allotted to exporters by a committee made up of the governor and other officials. Money could be borrowed by exporters from the *obras pias*, or pious foundations, of which there were many. A company, formed in 1733, was given the monopoly of direct trade between Manila and Cadiz, but nothing was done by it. From 1765 to 1783 galleons traded between the two above ports on behalf of the government. In 1785 was created the Royal Company of the Philippines, with a monopoly of trade between the Philippines and Asia and Cadiz. This company, like its predecessor, although it encouraged agriculture and industry, never prospered to any great extent, and was finally abolished in 1834. Manila became a free port in 1789 for the importation of all Asiatic products, and free entrance was given to all foreign ships. Through negotiations with Great Britain, general permission was given to foreigners in 1814 to establish themselves in the Philippines, and some enterprising English, German, French, and American business houses soon took advantage of this opportunity. This greatly stimulated commerce. Manila was made a free port for all foreign trade in 1837, and in 1855, the ports of Sual, Iloilo, and Zamboanga were also opened to trade. In 1865, the same permission was extended to the port of Cebú. Ports open to trade at the present time are Manila, Iloilo, Cebú, Joló, Zamboanga, Bonga, Balabac, Jurata and Sitanki. The opening of the Suez canal in 1859 was a decided impulse to the commerce, and the later laying

of cables to Hongkong and Manila made commercial communication much more easy. Another potential factor was the suppression of the tobacco monopoly in 1883. During the last years of Spanish sovereignty, Spain by the laying of preferential duties on goods carried in Spanish bottoms, obtained a fair share of the carrying trade of both imports and exports, but the British were then, as now, the great carriers. During the last years of Spanish rule, the value of trade was near the present figures, but it is destined, in the near future, to eclipse the brightest hopes of even 15 years ago. China (including Hongkong), the United Kingdom, and the United States, were the best customers in the old days. They are so yet, but the last-named country is fast taking first place. Abacá, or manila hemp, is still the greatest of all exports in value, and most of this goes to the United States. Next in value are sugar copra and tobacco. Imports are all manufactured articles generally. If Manila can be made a direct shipping port, most of the goods carried to Hongkong for reshipment can be shipped direct to their destination, thus effecting a saving in both time and money. The leading European countries, as well as the United States, are making strenuous efforts to secure their share of Philippine trade, and with the increased number of whites who have taken residence in the islands, wants must increase rapidly. In 1893, which represents a normal year before the Tagálog insurrection of 1896, exports were valued at about $30,000,000. In 1901 (for the fiscal year ending June 30), they were valued at $26,431,262; in 1902, $23,927,679; in 1903, $33,119,899; in 1904, $30,250,627; in 1905, $32,352,615; in 1906, $31,918,380; in 1907, $33,713,357; in 1908, $32,816,567. These figures show that the islands are assuming their normal tone, and recovering from the losses caused by war, typhoon, locusts and rinderpest. Of these exports, $2,572,021 went direct to the United States in 1901; $7,693,743, in 1902; $13,863,659, in 1903; $11,102,775, in 1904; $15,668,026, in 1905; $11,579,411, in 1906; $12,079,204, in 1907, and $10,323,233, in 1908. Imports for the above years were as follows: In 1901, $32,818,411; in 1902, $32,141,842; in 1903, $32,971,882; in 1904, $33,220,761; in 1905, $30,876,350; in 1906, $25,799,266; in 1907, $28,785,855; in 1908 $30,918,357. The United States shared in this import trade as follows: In 1901, $3,034,655; in 1902, $4,035,243; in 1903, $3,944,038; in 1904, $4,633,216; in 1905, $5,761,498; in 1906, $4,333,893; in 1907, $5,155,359; in 1908, $5,079,487. The United Kingdom is still in the lead in the matter of imports, the total for 1907 being $6,457,910, but at the rate of increase in the United States, it seems probable that the latter country will ere long take first place in Philippine import trade. The largest increase in imports is in cotton goods and in iron and steel, all of which the United States can supply better than any other country. The exports for

1907 is more than $500,000 in excess of any previous year in the history of the islands. The import trade shows that the heavy shipments of rice, the importation of which was necessary during recent years because of the adverse conditions ruling, have very materially ceased and the islands are in greater proportion becoming their own base of supplies. During the Spanish regime, the revenues of the islands were raised from the tribute and taxes paid by the natives, and the duties and trade and residence licenses paid by the Chinese. The natives were required to furnish supplies at certain fixed rates, and to give a certain number of days' work each year to the government. The tribute later took different form and was known as a head or poll tax. The natives were subject to various other taxes, but all told, at least during much of the Spanish rule, the amount collected, after deducing the share that found its way into the pockets of the public officials, was not sufficient for the support of the Philippine government. To make up the deficit, it was necessary, consequently, to send money from Mexico. This was known as the *situado*, and was based on the duties collected at Acapulco, Mexico, on the Chinese merchandise shipped from Manila, which were returned to Manila as rightfully belonging to the islands. The non-receipt of the situado at times because of piracy or shipwreck, or failure to sail, more than once threatened the ruin of the islands, and the government was sustained only by loans, either forced or voluntary. During the latter part of Spanish rule, Mexican silver was the most usual coin in circulation, although a special Philippine coin had been struck. Since American occupation, revenue has been raised by tariff on imports, by a land and poll tax and various licenses, etc. Since 1898, receipts and expenditures, exclusive of all items of a refundable character, for the fiscal years ending June 30, are as follows: Receipts—1899, $3,558,682.83; 1900, $6,899,340.53; 1901, $10,753,459.95; 1902, $12,579,357.20; 1903, $14,826,284.41; 1904 $15,476,233.42; 1905, $16,098,574.10; 1906, $17,972,929.03; 1907, $17,445,489.49; 1908, $17,698,559.91. Expenditures—1899, $2,376,327.12; 1900, $4,758,793.66; 1901, $6,451,528.37; 1902, $10,444,857.62; 1903, $13,408 406.29; 1904, $15,040,691.98; 1905, $16,297,280.54; 1906, $16,974,262.67; 1907, $14,704,852.44; 1908, $17,735,051.82. The bonded indebtedness of the islands is $13,500,000. A recent statement by William H. Taft is to the effect that the Philippines have not cost the United States anything beyond certain expenditures of the coast and geodetic survey. By an act of 1903, March, a silver peso of 416 gr., nine-tenths fine, was made the legal money of the archipelago, with several subsidiary coins, the lowest of which is the centavo or cent. The peso is worth 50 cents United States gold. An act of Congress, 1906, June 23, authorized the reduction of the weight and fineness of the peso and subsidiary coins because of the increase in the value of sil-

ver, which had made the intrinsic value of such coins greater than their face value as currency. The peso now weighs 20 grams, .800 fine; the half peso, 10 grams, .750 fine; the 20 centavo, 4 grams, .750 fine, and the 10 centavo, 2 grams .750 fine. In accordance with the act of Congress approved 1906, June 23, the Philippine government is authorized to use as reserve, against which currency can be issued, gold coin of the United States, up to 60 percent. of the certificates outstanding. The certificates in use are of the denominations of 20, 50, 100 and 500 pesos. An act of Congress, approved 1907, March 4, provided for the establishment of an agricultural bank, but as private capital hesitated to enter the enterprise, the Philippine government established the bank 1908, June 18, and appropriated 1,000,000 pesos as its capital. The bank began operations in October 1908.

Government.—China is said to have owned the Philippines some centuries before the advent of the Spaniards, but so far as can be seen, the Chinese did not have any influence on the government. The Spaniards found the people divided into three classes—nobles, freemen and slaves. Communities lived in a curious mixture of freedom and despotism, for in many instances the power of the chiefs was simply nominal, and influence depended rather on wealth than on blood. The Spaniards, wisely maintaining old native customs, retained the government unit of the barangay as well as certain of the old legal customs of the natives. Until the revolution in Mexico, the islands were a dependency on that country, although, of course under the chief control of the Council of the Indies (later the colonial ministry). The head executive, who combined executive, legislative and judicial powers, was styled governor and captain general. To aid, and at once restrict him, an Audiencia consisting of three oidors and one fiscal, was appointed. Financial affairs were in charge of the treasurer, and later an intendant. The other royal interests were, for many years, in charge of an accountant and a factor. In the provinces, the head governor was usually an alcalde-mayor, although sometimes a corregidor. The municipalities were entrusted for the most part to native executives, called gobernadorcillos, and their councils. Over these, the friars usually exercised supervision, although, during the later years of Spanish rule, it became at times the policy of the government to lessen their power. In general, government circles were honeycombed with graft, and an honest governor was almost an anomaly. After American occupation, the military control speedily gave way to civil government. Retaining the old name as more familiar to the people, the head American executive is known as the governor-general. The legislative functions were at first vested in the Philippine Commission, which was composed of both Americans and Filipinos. As early as 1902, a popular native assembly was projected and in January, 1907,

the Philippine Commission passed the Philippine election law. This law divides the provinces (exclusive of Manila) not inhabited by Moros or other non-Christian tribes into 78 assembly districts, each province to constitute at least one district, and the more populous being divided into more districts in the ratio of one to every 90,000 of population and major fraction thereof remaining. The first election was held 1907, July 30, and the first assembly, which consisted of 80 delegates, two of whom represent Manila, was opened 1907, Oct. 16, by William H. Taft, United States secretary of war. The Nacionalistas or party favoring immediate independence elected the majority of their candidates to the assembly. The Philippine Commission, which is the upper house of the legislature, has a veto on all measures of the assembly. This is an interesting experiment, and one that will tend to fit the Filipino for the self-government, or independence, which it is the confessed policy of the American government to bestow on the Filipinos at a future date. It is to be noted that the Philippines are a dependency rather than a true colony.

History.—Throughout the Spanish règime, the Philippines, which had been colonized primarily for commercial reasons, were managed in large part in ecclesiastical interests. The royal patronage of the Indies, conceded to the Catholic sovereigns by Pope Alexander VI., together with the natural tendencies of the Spanish character, accounts largely for this fact. By reason of the religious element entering so universally into almost every act of the government, there arose, as might be expected continual friction between the ecclesiastical and civil estates. The presence of the powerful religious orders still further intensified the troubles. Consequently, there are found, not two, but three elements in this ecclesiastico-civil strife. From the peculiar powers granted to them at the beginning of the conquest, to which they contributed so potent a factor, the regulars were often pitted against the secular priesthood, and still more often against the civil government; while, on the contrary, they were often allied with one or the other, according to their interests. The Jesuits, in addition, added still another factor, for they acted quite independent of the friar orders, allying themselves with that part which best suited their purpose. The religious orders represent the most powerful continuous factor in the history of the Philippines. At all times, they resisted strenuously the attempts at episcopal visitation of the curacies in their charge, asserting that such visitation was vested in their own spiritual heads, their provincials. Four of these ecclesiastico-civil disputes stand out prominently because of their violence and effects: the controversy between Domingo de Salazar, the only Bishop of Manila, and Gomez Perez Dasmariñas, in 1591, over the collection of the tribute, and mission work among the natives; the controversy between Gov. Sebas-

tian Hurtado de Corcuera and the Jesuits, on the one side, and Archbishop Guerrero and the secular priests and the friar orders on the other (1635–44), over the question of the royal patronage and ecclesiastical immunity; the Pardo controversy, which lasted almost through Pardo's term as archbishop (1677–89), in which Pardo, a Dominican, was pitted against his own ecclesiastical chapter, against the other orders, and against Gov. Vargas, and allied with the successor of the latter, Gov. Cruzalaegui: and the Camacho controversy (1697–1706), waged by Archbishop Camacho, supported by the government, in favor of episcopal visitation. During the earlier portion of Spanish rule, the religious orders accomplished much for Spanish interests, in their civilizing, educating and Christianizing influence, but during the later years, their conservatism and their failure to identify themselves with the modernizing influences that came from the outside were a serious obstacle to progress and development, and at the end were a potent factor in the downfall of Spanish sovereignty. The first discovery of the islands was by Magellan in 1521, by whom they were called the Archipelago of St. Lazarus. However, with other nearby islands, they were for many years known to the Spaniards as the Western Islands, because reached by sailing west. Similarly they were known to the Portuguese as the Eastern Islands, because reached by them by rounding the Cape of Good Hope. The name 'Filipina' was first bestowed on Mindanao by Villalobos, in his disastrous expedition of 1542, in honor of Philip, prince of Asturias, later Philip II. of Spain, and the name was soon extended to all the group, which were called Filipinas, or Philippines. Permanent Spanish occupation began in 1565, the first settlement being planted at Cebú, by Miguel Lopez de Legazpi, who was despatched from New Spain in 1564. From that time, notwithstanding the attempts of the Portuguese during the earlier years to dislodge them, Spanish occupation was continuous and in a sense complete until 1898, with the exception of the years 1762–64, when the British occupied Manila and adjacent territory. Manila, then a native settlement, was made the Spanish capital in 1571. In 1581, it was declared the seat of a bishopric dependent on Mexico, and by decrees of 1595 it was erected into a metropolitan city with three suffragans. Before the end of the century Spanish troops had overrun and pacified with remarkable ease a great part of the island of Luzón and adjacent islands, and Spanish possession was assured. In 1574, the assault of Manila by the Chinese pirate, Limahon, seriously threatened the colony, but his defeat greatly strengthened Spanish sovereignty. The new colony advanced steadily with the advantages of the Chinese trade thrown open to it, and Manila became a trade center of considerable importance. But the restrictive commercial measures of the Spanish government prevented its full growth, and caused it even to

decline. Indeed the restrictive policy of Spain, not only in commerce, but also in politics and religion, sounded the death knell of the colony long before 1898. Of the 114 government periods, not one surpassed in achievement that of Legazpi. Comparatively little more of the islands was conquered after his death. To the last the Spaniards did not succeed in conquering the Igorots or the Moros completely, although the latter were greatly restrained after the introduction of small steam gunboats. Yet, taken as a whole, the history of the islands shows a melancholy lack of positive results. The really energetic governors are less than a score. Of them Simon de Anda y Salazar is especially remarkable for his patriotic zeal and his fearlessness, for he successfully opposed the British in the time of their occupation of Manila (1762-64), and made headway against the religious orders. In some features he marks the beginning of the new order, which came in with greater force almost at the commencement of the 19th century—namely, the spread of modern ideas, and liberalism. The greater commercial freedom; the coming to the Philippines of Spaniards in greater numbers than ever before; the greater ease of communication, with the opening of the Suez Canal and the laying of cables; the use of steamboats; better educational facilities, and the sending of many Filipino youths to Europe for travel and study; all these helped to overthrow or make untenable the old ideas of restriction. The execution of the three native priests in 1872 for alleged participation in the so-called Cavite insurrection was bad policy on Spain's part, and was charged by many to the hostility of the friars. During the remainder of Spain's tenure in the islands, many requests for reforms were heard, and many murmurs arose against both government and friars. The publication of Dr. José Rizal's novel, *Noli mi tangere*, in Germany, in 1887, marks an epoch in Filipino history. This book, despite the efforts aimed at by its proscription became the most widely read book in the Philippines, and fostered the revolution, although its author was not a separatist. Rizal's execution by order of the Spanish government, 1896, Dec. 30, has made him forever the idol and saint of his countrymen. Other reformers, such as Marcelo H. del Pilar, labored untiringly for greater freedom. The masses among the Tagàlogs were organized first under Andrés Bonifacio into the Katipunan Society, in 1894, the secrets of which are not yet unveiled. The revolution broke out in 1896, August, under the leadership of Bonifacio, but his assassination soon after placed Aguinaldo (q. v.) at the head of the movement. The insurrection dragged on until the pact of Biak-na-bató, signed between Gov. Primo de Rivera and the Tagalog leaders, 1897, Dec. 14, by which Aguinaldo and 27 companions agreed to leave the Philippines for the sum of 800,000 pesos. One-half this sum was actually paid, but no second payment was ever made.

The arrival of the American fleet before Manila, shortly after the declaration of war between Spain and the United States, in 1898, completely changed the complexion of affairs, and the Filipino insurgents immediately availed themselves of the opportunity to again rise in revolt. By the treaty of Paris, signed between Spain and the United States, 1898, Dec. 10, the islands were ceded to the latter for $20,000,000. This passing of the sovereignty of the islands from one power to another was not relished by many of the natives. The latter imagined themselves tricked by the Americans, who so the Filipinos declared, had treated with them as with a separate power. Consequently, another insurrection soon broke out under leadership of Aguinaldo (1898), but it was quelled by the capture of the latter. The great intellectual power of this revolution was the remarkable Filipino, Mabini, whom the United States government exiled to Guam, but allowed to return before his death. During American occupation, despite much bungling, great advance has been made. Education especially has received great impetus, and is eagerly sought by all classes of the Filipinos. Public sanitation has gained great headway, and scientific research is steadily being pursued. As soon as possible after the restoration of peace, the management of affairs was removed from the military branch of the government and given into the control of the civil branch (1902). There have been four governors-general, namely, Wm. H. Taft, Luke E. Wright, Henry C. Ide, and the present incumbent, James F. Smith. The recent constabulary troubles gave some reason for anxiety, but with the speedy reforms that were introduced, good feeling was greatly restored. Although some contrary opinions are heard, the mass of the people appear more and more to trust the good faith of the United States, and believe that they will ultimately receive independence or entire autonomy.

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pine Islands and Their People (New York 1898), and Atkinson, *The Philippine Islands* (Boston 1905), give good preliminary surveys of the islands. Foreman, *The Philippine Islands* (last ed. 1906), and Sawyer, *The Inhabitants of the Philippines* (London 1900) both contain much that is valuable, but they must be used with discrimination. The same is also true of H. Parker Willis, *Our Philippine Problem* (New York 1905). One of the most valuable books that has appeared is LeRoy, *Philippine Life in Town and Country* (New York 1905); and periodical indexes should also be consulted for articles by the same writer. In German, the best book is Jagor, *Reisen auf den Philippinen* (Berlin 1873); in French, Mallat, *Les Iles Philippines* (2 vols., Paris 1846). In Spanish, the best modern history is that of Montero y Vidal, *Historia General de Filipinas* (3 vols. Madrid 1887–1895). The best of the old general histories are those of Concepción, *Historia General de Filipinas* (14 vols., Sampaloc 1788–92), and Martinez de Zuñiga, *Historia General de Filipinas* (Sampaloc 1803). The work of the Jesuits of Manila published in 1900 by the United States, *El Archipiélago Filipino,* contains much useful material. For bibliographies, see Robertson's bibliography in vol. 53 of the Blair-Robertson series; Retana's various contributions, and those of Medina, all of which are in Spanish; and the bibliographies of A. P. C. Griffin and Dr. T. H. Pardo de Tavera, published under the auspices of the Library of Congress (Washington 1903).

PHILIPPINS, *fĭl'ĭp-pĭnz:* Russian sect, named from the founder Philip Pustoswiät, under whose leadership they emigrated from Russia in the end of the 17th c. They are a branch of the RASKOLNIKS (q.v.). They call themselves Starowerski, or 'Old Faith Men,' because they cling with utmost tenacity to the old service-books, the old version of the Bible, and the old hymn and prayer-books of the Russo-Greek Church, in the exact form in which these books stood before revision by the patriarch Nikon in the middle of the 17th c. There are two classes of the Raskolniks—one which recognizes popes (Russian priests); the other which admits no priest or other clerical functionary. The Philippins are of the latter class; and they not only themselves refuse all priestly ministrations, but they regard all such ministrations—baptism, marriage, sacraments—as invalid; and they rebaptize all who join their sect from other Russian communities. All their own ministerial offices are discharged by the Starik, or parish elder, who for the time takes the title of pope, and is required to observe celibacy. Among the Philippins fanaticism at times has run to the wildest excesses. They refuse oaths, and decline to enter military service; and having, on account of this, and many other incompatibilities of the system with the Russian practice, encountered much

persecution, they resolved to emigrate. Accordingly, 1,700, under the leadership of Philip Pustoswiät, they settled partly in Polish Lithuania, partly afterward in e. Prussia, where they still have several small settlements with churches of their own rite. They are reported to be a peaceable and orderly race. Their principal pursuit is agriculture; and their thrifty and industrious habits have secured for them the good-will of the proprietors.

PHILIPPITE: a mineral belonging to the group of Zeolites, formerly regarded as orthorhombic, but now ascertained to be monoclinic in crystallization. Crystals always twinned. Hardness, 4–4.5; specific gravity, 2.2; luster, vitreous; color, white; translucent to opaque. Composition: Silica, 47.9; alumina, 20.5; lime, 7.4; potash, 6.3; water, 17.9 = 100, corresponding to the formula, $4SiO_2,Al_2O_3,(\frac{2}{3}CaO + \frac{1}{3}KO),5HO$. Occurs in vesicular cavities in old igneous rocks, and also of recent formation in the walls of the hot baths of Plombières, France.

PHILIPPIUM: in chemistry, an element closely allied to cerium. Though described by Delafontain in 1888 as a newly discovered element, it was not until 1897 that it was acknowledged to be such by English chemists. Philippium has been found in gadolinite, samarskite and fergusonite. It appears in two sets of compounds, the philippous and the philippic, corresponding to a white acid and an orange oxide. The salts of the first series are colorless, quite stable, crystallize well, and correspond to the lanthenum and yttrium salts. Philippic oxide has a deep orange-red color. The constitution of philippium compounds remains to be established.

PHILIPPOPOLIS, *fĭl-ĭp-ŏp'ōlĭs*, or Filippopel (Turk. *Felibe*): Thracian city, chief town of the recently organized province of Eastern Roumelia, Turkey; 112 m. w.n.w. from Adrianople, 309 m. from Constantinople; on a small island formed by the Maritza, which here becomes navigable. This island rises as a hill in a vast plain, which extends beyond Adrianople on the e., and from the base of the Rhodope Mts. on the s. to the Balkan chain on the n. The plain is extremely fertile. The city was named from its capture by Philip of Macedon, who made it one of his frontier posts. By the Romans it was known as Trimontium. It was the ancient capital of Thrace, and at its destruction by the Goths 100,000 people are said to have been slain. In 1360 it came under Turkish rule, suffered from earthquake 1818, and from conflagration 1846. The Russian forces occupied the city 1877–8. Philippopolis has very extensive commerce, and is the seat of a Greek abp. Three-fifths of the inhabitants are Christians, one-fifth Jews and gipsies, the remainder Mohammedans. Pop. (1900) 42,849.

PHILIPPOTEAUX, *fē-lē-pŏ-tō*, HENRI EMMANUEL FELIX: French painter: b. Paris, 1815, April 3; d. there, 1884, Nov. 9. After studying his art under Cogniet he applied himself to the painting of battle scenes, and his canvases give a vivid and almost complete panorama of 19th century wars. His mastery of details and lively delineation of the clash and movement of combat are remarkable. Among his principal pictures are: *The Evacuation of Moscow* (1835); *The Capture of Ypres; The Siege of Antwerp in* 1792 (1838); *Louis XV. Visiting the Battlefield of Fontenoy* (1840), in the Luxembourg; *The Battle of Rivoli* (1845); *Charge of the Chasseurs d'Afrique at Balaclava* (1859); *The Siege of Puebla* (1865); *The Meeting of Henry IV. and Sully after the Battle of Ivry* 1590 (1875), now in the Museum at Versailles; *Bayard on the Bridge of Garigliano* 1503; *The Battle of Alma* (1875); *A Panorama of the Siege of Paris* 1870–1; and several other war panoramas.

PHILIPPSON, *fē'lēp-zōn*, MARTIN: German historian: b. Magdeburg, Germany, 1846, June 27. He was educated at Bonn and at Berlin, became docent at Bonn in 1871, and in 1878 was appointed to the chair of history in the University of Brussels. A bitter controversy arose with the anti-German student body in 1890, and Philippson resigned his professorship. He wrote: *Geschichte Heinrichs des Löwen* (1868); *Geschichte des preussischen Staatswesens vom Tode Friedrichs des Grossen bis zu den Freiheitskriegen* (1880–2); *Das Leben Kaiser Friedrichs III.* (1900); *Kurfürst Friedrich Wilhelm von Brandenburg* (1879–1901); etc.

PHILIPS, *fĭl'ĭps*, AMBROSE: 1675–1749; b. Shropshire, England. He took his degree M.A. at St. John's College, Cambridge, 1700. In 1709 his Pastorals appeared, with those of Pope, in *Tonson's Miscellany;* and 1712 he brought on the stage *The Distressed Mother*, a tragedy adapted from Racine's *Andromaque*, which had great success. Some translations from Sappho, in the *Spectator*, added greatly to Philips' reputation, but Addison is believed to have assisted in these classic fragments. Exaggerated praise of Philips having appeared in the *Guardian*, Pope ridiculed his Pastorals in a piece of exquisite irony, which led to a bitter feud; and Philips even threatened personal chastisement, and hung up a rod in Button's Coffee-house, but no encounter took place. One of the names fastened upon Philips was 'Namby Pamby,' from a style of verse adopted by him in complimentary effusions, consisting of short lines and a sort of infantine simplicity of diction, yet not destitute of grace of melody. Philips is known in literary history from the friendship of Addison and the enmity of Pope; but his poetry, lacking energy and passion, has fallen out of view.

PHILIPS, EDWARD: English author: b. London, 1630,

August; d. there about 1696. He was educated under the care of his uncle, John Milton, and studied for a time at Oxford. Later, with his brother, John, (1631–1706), who had been Milton's assistant as Latin secretary to Cromwell's government, he joined the Cavalier party, which proceeding resulted in an estrangement from his uncle. He engaged in literary work, edited a volume of poems by William Drummond, and supported himself by literary hack work and tutoring in noble families. Subsequently he became reconciled to his uncle and was a warm admirer of his work. He wrote: *New World of English Words* (1658); *Theatrum Poetarum* (1675); *Life of Milton* (1694); etc.

PHILIPS, Francis Charles: English novelist and dramatist: b. Brighton, Sussex, 1849, Feb. 3. He was educated at Brighton College, entered the army, where he served three years, became a barrister in 1884, and began writing novels and plays. His novel, *As in a Looking Glass* (1885), was dramatized and played by both Sarah Bernhardt and Mrs. Beere. He collaborated in writing the plays: *A Woman's Reason; The Fortune of War; Papa's Wife;* etc., and among his novels are: *The Dean and His Daughter*, dramatized (1887); *Mrs. Bouverie* (1894); *The Luckiest of Three* (1896); *Men, Women, and Things* (1898); etc.

PHILIPS, George Morris, A.M., PH.D.: American educator: b. Atglen, Pa., 1851, Oct. 28. He was graduated from Bucknell University, Lewisburg, Pa., in 1871, and has been principal of the Pennsylvania State Normal School, Westchester, Pa., from 1881. He has published: *Astronomy* (1882); *Natural Philosophy* (1884); *Civil Government of Pennsylvania* (1893); *Geography of Pennsylvania* (1895); *Nation and State* (1905); *Pennsylvania Geography* (1907); etc.

PHILIPS, or Phillips, John: English poet: b. Bampton, Oxfordshire, 1676, Dec. 30; d. Hereford, England, 1709, Feb. 15. He was educated at Winchester and Oxford, and won his first literary success on the publication of his *Splendid Shilling*, written in blank verse in imitation of Milton. His *Cyder* was also an imitation, after Virgil's *Georgies*, and *Blenheim*, which was a Tory celebration of Marlborough's victory, was written in reply to Addison's *Campaign*. He is the only notable writer in blank verse between Milton and Thomson.

PHILIPS, Katherine Fowler: English poet: b. London, 1631, Jan. 1; d. there 1664, June 22. She was married to Hector Philips in 1647 and afterward accompanied the Viscountess Dungannon to Ireland. On her return to London she became a member of the famous literary circle which included Jeremy Taylor and Sir Charles Cotterel and was known among them as 'the matchless Orinda.' Her translation of Corneille's *Pompée* was very successful and was acted in 1663–4. An unauthorized edition of her poems was printed in

1663 and her letters to *Poliarchus* (Sir Charles Cotterel) were published in 1705. Consult Gosse, *Seventeenth Century Studies* (1883).

PHILIPSE, *fĭl'ĭps*, FREDERICK: 1626–1702, Dec. 23; b. Holland. He belonged to a noble family, came to New Amsterdam about 1640, learned the carpenter's trade, went into business and accumulated considerable property. By marriage to a wealthy widow he secured the control of valuable estates. He engaged in the African slave trade, and also had a large business with the Indies. After his wife died he married a Miss Van Cortland 1690, who inherited a large fortune. Philipse obtained from the government and the Indians a large tract of land between Spuyten Duyvil and the Croton river, and secured from the king a manorial charter covering the present town of Yonkers and 150 sq. m. An Episcopal church which he erected is said to be the oldest building of the kind in the country. For many years he was a member of the council of the royal governor.—His grandson, FREDERICK PHILIPSE, 1690–1751; b. New York. He was educated in Europe, after which he returned to his inherited manor as the head of his family. He was judge as well as feudal sovereign, and even inflicted capital punishment.—FREDERICK PHILIPSE, 1746–1785; b. New York, son of the latter Frederick. He graduated from Columbia College, lived in magnificent style; was banished with confiscation of property for taking sides with the British.

PHILIPSON, *fĭl'ĭp-sŏn*, DAVID, D.D.: American rabbi: b. Wabash, Ind., 1862, Aug. 9. He was graduated from the University of Cincinnati and from the Hebrew Union College there in 1883. In 1884–8 he was rabbi of the Har Sinai Congregation in Baltimore, and has since been in charge of the B'ne Israel Congregation, Cincinnati, and professor of homiletics in the Hebrew Union College there. He is prominently connected with various charitable and other associations and has published: *The Jew in English Fiction* (1889); *Old European Jewries* (1894); *The Oldest Jewish Congregation in the West* (1894); *Reminiscences by Isaac M. Wise* (1901); *The Reform Movement in Judaism* (1907); etc.

PHILISTINE, n. *fĭ-lĭs'tĭn* [Eth. *phalasa*, to wander about]: one of the anc. inhabitants of the s.w. coast of Palestine (see PHILISTINES). In *Germany*, a term applied to the non-academic portion of a university town, as opposed to the *gown;* also to all non-students in general. The term was applied by Matthew Arnold to the middle class of England, which, he says, is ignorant, strenuously obstructive, and narrow-minded; and in current literature it denotes a prosaic, stolid person. A wider application is indicated by Leslie Stephen's definition of Philistine as 'a term of contempt applied by prigs to the rest of their species.' PHILIS'TINISM, n. *-ĭzm*, manners or practices of the (modern) Philistines.

PHILISTINES, *fi-lĭs'tĭnz* (in the Septuagint, Ἀλλοφυλοί, Strangers): term derived from a root *phalasa* (Eth.), to emigrate, wander about (see PHILISTINE), or identified with Pelasgi, or (as some say) to be compared with *Shefela* (Heb.), lowlanders; designating a population mentioned in the Bible as being in frequent contact with the Jews, and living on the coast of the Mediterranean, s.w. of Judæa, from Ekron toward the Egyptian frontier, bordering principally on the tribes of Dan, Simeon, and Judah. Our information about the origin of the P. is extremely obscure and contradictory. The genealogical table, Gen. x. 14, counts them among the Egyptian colonies (the 'Casluhim, out of whom came Philistim'); according to Amos ix. 7, Jer. xlvii. 4, and Deut. ii. 23, they came from Caphtor. But supposing that the Casluhim were some separate tribe, and yet Caphtorian colonists, the question remains, whether Caphtor can be identified with Cappadocia in Asia Minor, as the early versions (*LXX.*, *Targ.*, *Pesh.*, *Vulg.*) have it; or whether it be Pelusium, Cyprus, or the Isle of Crete. The latter opinion seems not the least probable. At what time they first immigrated, and drove out the Canaanitish inhabitants, the Avvim, is difficult to conjecture. They appear to have been in the country as early as the time of Abraham; and in the history of Isaac, Abimelech, King of Gerar, is distinctly called king of the P. Yet, even supposing that in Genesis the country is designated by the name which it bore at a later period, there can yet be no doubt of the people being firmly established at the time of Moses (Ex. xv. 14, etc.). Thus the date of their immigration would have to be placed not later than about B.C. 1800. At the Exodus, Moses, evidently fearing for his undisciplined band an encounter with the warlike colony, did not choose the shorter way to Canaan through their territory, but preferred the well-known circuitous route. At a later period, however, Joshua, having triumphed over 31 Canaanite princes, conceived the plan of making himself master of the possessions of the P. also; but his intended disposal of their country for the benefit of the tribe of Judah was never accomplished. At this time, they were subject to five princes (Seranim = axles, pivots), who ruled over the provinces of Gaza, Ashdod, Askelon, Gath, and Ekron. Not before the period of the Judges did they come into open collision with the Israelites; and the strength and importance in which they then suddenly appear, contrast so strangely with their insignificance at the time of the patriarchs, that many theories—a double immigration principally—have been propounded in explanation. We find them daring to face powerful nations like the Sidonians, whom, about B.C. 1209, they forced to transfer their capital to a more secure position on the island of Tyre; or the Egyptians under Rameses III., with whom they engaged in naval warfare at the same time. With the Israelites their war was of the nature of guerilla raids, some-

times into the very heart of the country. Under Shamgar, about B.C. 1370, they were repulsed, with a loss of 600 men; however, about 200 years later, the Israelites were tributary to them, and continued to groan under their attacks, with occasional pauses only, until Samson first began to humiliate them. But they were still so powerful at the time of Eli, that they carried away the ark of the covenant. Under Samuel, their rule was terminated by the battle of Mizpah. Saul was constantly engaged in warding off their new encroachments; and at Gilboa, he and his sons fell in a disastrous battle against them. At this time, they seem to have returned to their primitive form of a monarchy, limited, however, by a powerful aristocracy, the king's formal title again being 'Abimelech' = 'Father-king,' as we find it in Genesis. David succeeded in routing them repeatedly; and under Solomon their whole country seems to have been incorporated in the Jewish empire. The subsequent internal troubles of Judæa emboldened the P. once more to open resistance. Under Joram, in union with the Arabians, they invaded Judæa; and not only carried away the royal property, but also the sérail and the royal children. Uzziah, however, recovered the lost ground; he overthrew them, and dismantled some of their most powerful fortresses—Gath, Yabne, and Ashdod—and erected forts in different parts of their country. Under Ahaz, they rose again, and attacked the border-cities of the 'plain' on the S. of Judah; and a few years later, renewed their attacks, in league with the Syrians and Assyrians. Hezekiah, in the first years of his reign, subjected their whole country again, by the aid of the Egyptians, whom we find in the possession of five cities. The Assyrians, however, took Ashdod, under Tartan, which was retaken again by Psammetich, after 29 years' siege. About this time, Philistæa was traversed by a Scythian horde on their way to Egypt, who pillaged the temple of Venus at Askelon. In the terrible struggles for supremacy which raged between the Chaldæans and Egyptians, Philistæa was the constant battle-ground of both—her fortresses being taken and retaken by each in turn; so that the country soon sank into ruin and insignificance. Yet a shadow of independence seems to have been left to it, judging from the threats which Zachariah (ix. 5), after the exile, utters against Gaza and Askelon, and their pride. In the time of the Maccabees, the P. were Syrian subjects, and had to suffer occasionally from the Jews, though intermarriages between the two nations were not rare. Alexander Balas transferred part of the country to Judæa; another part was taken by Alexander Jannæus; Pompey incorporated some of the cities with Roman Syria; Augustus transferred another portion to Herod; and finally, Salome, his sister, received a small principality of it, consisting of Jamnia, Ashdod, and Askelon. But by this time the name of the country had long been lost in that of Palestine, all the territory between the Lebanon and Egypt.

Of their state of culture, institutions, etc., we know very little. They appear as a civilized, agricultural, commercial, and warlike nation. They traded largely, and their wares seem to have been much sought after. Their worship was much akin to that of the Phœnicians —a nature-religion, of which Dagon, Ashtaroth, Baalzebub, and Dercete were chief deities. Priests and soothsayers abounded; their oracles were consulted even by people from afar. They carried their charms about their persons, and their deities were taken with them to the wars. They do not seem to have practiced circumcision. As to their language, so little has been known about it, that conjectures have seemed more than usually vain. Those who have assigned the P. to a Semitic origin, or to a Pelasgic, have usually assigned their languages similarly. But it is certain, that at least their proper names, as recorded in the Bible, and other names recently discovered on the Assyrian monuments, are mostly Semitic; and it has now become evident that though both before and after the captivity there existed a difference of dialect between the Hebrew and the Philistæan idiom, the difference was only dialectical.

PHILLIP, *fil'ip*, John: artist: 1817, Apr. 19—1867, Feb. 27; b. Aberdeen, Scotland. Before his 15th year he had painted pictures showing his feeling for color. Aided by Lord Panmure, he went to London to pursue his studies, at first copying from the Elgin marbles at the British Museum, and after a few months admitted as student at the Royal Acad. All his early subjects were Scotch, e.g., a *Scotch Fair*, *Baptism in Scotland*, a *Scotch Washing*, *The Offering*, etc. In 1851 he went to Spain for health, and returned with a change in the character of his subjects, taking rank at the head of the painters of the habits and customs of the Spanish people. In 1853 he exhibited at the Royal Acad. *Life among the Gypsies at Seville.* His pictures for 1854–5, *A Letter-Writer of Seville* and *El Paseo*, were both purchased by the queen. In 1857 he attained the rank of associate of the Royal Acad.; and the following year exhibited a powerful picture of *Spanish Contrabandistas*, purchased by Prince Albert, of whom he also painted a portrait the same year for the town-hall of his native city. In 1859 he received the full honor of Royal Academician. His work for exhibition 1860, *The Marriage of the Princess Royal*, was pronounced by his fellow-artists and the public a decided success in a difficult field. His next portrait subject (exhibited 1863)—perhaps still more difficult—the *House of Commons*, 1860, containing more than 30 portraits of leading members of both sides of the house—was equally successful. His style is characterized by rich powerful color, broad light and shade, strong bold outline, and great variety and truthfulness of texture. No artist in his day had more power over his brush, or produced by his example a greater effect on the colorists of the present British school.

PHILLIPS, *fil'ĭps*, ADELAIDE: contralto vocalist (stage-name FILIPPI): 1833, Oct. 26—1882, Oct. 3; b. Stratford-on-Avon, England. She came to the United States 1840, and was put on the stage by her parents 1842, making her appearance first at Tremont Theatre, Boston. Jenny Lind advised and helped her to go to Europe. She arrived in London 1852, March, and began her studies with Manuel Garcia, and went next year to Italy. In that year she appeared at Brescia as Arsace in *Semiramide*. In 1855 she returned to America, and appeared at Philadelphia and in Havana. She next made a professional tour in Europe, and from 1864 till her death in Carlsbad, Germany, sang in numerous places in all parts of the United States. Miss Phillips had a powerful contralto voice of great range.

PHILLIPS, GEORGE SEARLE ('JANUARY SEARLE'): American author: b. Peterborough, England, 1818, January; d. Morristown, N. J., 1889, Jan. 14. He was graduated from Cambridge, came to New York, and engaged in journalism, but returned to England in 1845. He was editor of the Leeds *Times*, principal of the People's College, Huddersfield, Yorkshire, England, in 1846, and later came back to the United States, where he settled permanently. He edited the Chicago *Republican* in conjunction with Charles A. Dana (q.v.), and afterward was literary editor of the New York *Sun*. In 1873 he became insane, and the remainder of his life was spent in an asylum. He wrote: *Life of Ebenezer Elliott* (1850); *Memoirs of Wordsworth; Life at Home and Abroad; The Gypsies of the Dane's Dyke;* etc.

PHILLIPS, HENRY: American archæologist: b. Philadelphia, 1838, Sept. 6; d. there 1895, June 6. He studied law and was admitted to the bar in 1859, but practised little, devoting his attention chiefly to numismatics, archæology, etc. He published: *History of American Colonial Paper Currency* (1865); *History of American Paper Money* (1866); *Pleasures of Numismatic Science* (1867); *Poems from the Spanish and German* (1878); a translation of Chamisso's *Faust* (1881); and four volumes of translations from the Spanish, Hungarian and German (1884–7).

PHILLIPS, JOHN: Lawyer: 1770, Nov. 26—1823, May 23; b. Boston. He graduated at Harvard 1788, studied law, and became public prosecutor 1800, and representative to the Massachusetts general court 1803. He was state senator 1804 till his death, presiding officer of senate 1813–23. Phillips was active in the convention to revise the state constitution, and in obtaining the city charter for Boston, 1822, and was elected first mayor of Boston 1822, April 16. He declined re-election on account of delicate health. He was a member of the corporation of Harvard, and fellow of the American Academy of Arts and Sciences. He was a man of notable uprightness and of very vigorous intellect, and ex-

celled as an orator. The great anti-slavery orator Wendell Phillips was his son.

PHILLIPS, JOHN, LL.D.: 1719, Dec. 6—1795, April 21; b. Andover, Mass.; philanthropist. He graduated at Harvard College 1735; studied theology and began preaching; withdrew from the ministry and engaged in mercantile business in Exeter, N. H.; and became a member of the state council. In 1778 he aided his nephew, Samuel Phillips, in founding Phillips Acad. (q.v.), at Andover, with $31,000 and a third interest in his estate; and 1781 planned and founded Phillips Exeter Acad. (q.v.), with $134,000. He also aided liberally Dartmouth College and Nassau Hall, College of N. J. (Now Princeton University).

PHILLIPS, JOHN: English geologist: b. Marden, Wiltshire, 1800, Dec. 25; d. Oxford, England, 1874, April 24. He was educated under the supervision of his uncle, William Smith, the geologist, with whom he engaged in geological investigations in England. In 1834 he accepted the chair of geology at King's College, London, receiving an appointment to the same position at the University of Dublin in 1844 and at Oxford in 1856. He was keeper of the Ashmolean Museum, and in 1859–60 president of the Geological Society. He wrote *Guide to Geology* (1834); *Memoirs of William Smith* (1844); *Vesuvius* (1869); *The Geology of Oxford and the Valley of the Thames* (1871); etc.

PHILLIPS, JOHN ARTHUR: English geologist: b. Polgooth, Cornwall, 1822, Feb. 18; d. London, 1887, Jan. 4. He was graduated from the Ecole des Mines, Paris, in 1846. In 1848–68 he was a mining engineer and metallurgist in London, acted as chemist to the Admiralty Commission, and in 1848–50 was professor of metallurgy at the college for civil engineers at Putney. He inspected the California gold mines in 1853 and later years, and wrote: *The Mining and Metallurgy of Gold and Silver* (1867); *Elements of Metallurgy* (1874); *A Treatise on Ore Deposits* (1884); etc.

PHILLIPS, MORRIS: American journalist: b. London, England, 1834, May 9; d. Huntington, N. Y., 1904, Aug. 30. His elementary education was obtained at Cleveland and also in New York, where he settled in 1853. He rose in the *Home Journal* establishment from office boy to proprietor, was associated for 13 years with N. P. Willis (q.v.) in its management, and was identified with that weekly until it changed its name in 1902. He published *Abroad and at Home* (1893).

PHILLIPS, PHILIP: American jurist: b. Charleston, S. C., 1807, Dec. 17; d. Washington, 1884, Jan. 14. He studied law in Charleston; was admitted to the bar at 21; and was a member of the State constitutional convention of 1832, known as the Nullification convention. Elected to the State legislature in 1834, he resigned in 1835 and removed to Mobile, Ala., where he practised

his profession. He was president of the Alabama State convention in 1837; in 1844 was elected to the State legislature, and re-elected in 1852; was member of Congress from Alabama from 1853–5, and declining re-election he removed to Washington, D. C., and practised law until the Civil War, when he went to New Orleans, La. After the war he returned to Washington, where he resided until his death. In 1840 he prepared a *Digest of Decisions of the Supreme Court of Alabama*, and was the author of Phillips' *Practice of the Supreme Court of the United States*. As one of the eminent lawyers of his time, he was connected with some of the most noted law cases of the country.

PHILLIPS, PHILIP, D.D.: American Methodist evangelist and singer: b. Chautauqua County, N. Y., 1834, Aug. 13; d. Delaware, Ohio, 1895, June 25. In 1861 he opened a music store in Cincinnati, and during the Civil War held song services in many northern cities to aid the Christian Commission, and in 1866 was musical editor of the Methodist Book Concern. In 1868 he visited England, where he sang 200 nights for the Sunday School Union, and prepared for them *The American Sacred Songster*, of which 1,100,000 copies were sold. He traveled with D. L. Moody (q.v.), and in 1872 made a singing tour of the world. He published: *Spring Blossoms* (1865); *Hallowed Songs* (1871); *Our New Hymnal* (1894); etc.

PHILLIPS, SAMUEL: American colonial clergyman: b. Salem, Mass., 1690, Feb. 17; d. Andover, Mass., 1771, June 5. He was graduated at Harvard in 1708, studied theology and was ordained pastor of the Second or South Parish Church of Andover, in 1711, a pastorate which he held till his death. He was a notably strict Calvinist in his theology. His brother, John, was the great-grandfather of Wendell Phillips (q.v.), and his grandson, Samuel Phillips, was the founder of Phillips Academy at Andover.

PHILLIPS, SAMUEL: American lawyer and legislator: b. North Andover, Mass., 1752, Feb. 7; d. Andover, Mass., 1802, Feb. 10. He was a grandson of Samuel Phillips (1690–1771) (q.v.), and was the fifth of the name. He was graduated at Harvard in 1771. He succeeded his father as town clerk of Andover in 1773, was a member of the provincial congress 1775–80, and of the Massachusetts constitutional convention, 1779–80. He sat in the State senate 1780–1801 (excepting in 1787–8), was lieutenant-governor 1801–2, and justice of the court of common pleas for Essex County, 1781–98. He is best known as the founder of Phillips Academy, a project conceived by him soon after leaving college and to the furtherance of which he induced his uncle, John Phillips (q.v.), the founder of Phillips Academy at Exeter, to contribute. (See PHILLIPS (ANDOVER) ACADEMY.) His daughter, Mary, was the mother of Bishop Phillips Brooks (q.v.).

PHIL/LIPS, WENDELL: reformer and orator: 1811, Nov. 29—1884, Feb. 2; b. Boston; son of John P., first mayor of that city. He entered the Boston Latin School 1822; graduated at Harvard 1831, and at the law school 1833. While an undergraduate, he was a thorough student of history, and excelled in elocution and debate. His religious life began under the preaching of Dr. Lyman Beecher, and he retained through life the evangelical faith of his parents. Admitted to the bar 1834, he witnessed, 1835, Oct. 21, the dragging of William Lloyd Garrison through the streets by a mob of 'gentlemen of property and respectability.' From that day he avowed the anti-slavery sentiments that he had already imbibed from Miss Anne Terry Greene, who became his wife. He sacrificed for a despised cause all the advantages of his high social position, fine education, and personal graces; and 1839 relinquished the profession of law because he would not act under attorney's oath to support the constitution of the United States, with its guaranties to slavery. His first remarkable speech was in Faneuil Hall, 1837, Dec. 8, at a meeting promoted by Dr. William E. Channing, to denounce the murder of the Rev. Elijah P. Lovejoy by a mob at Alton, Ill. Atty.Gen. James T. Austin opposed the resolutions, comparing the pro-slavery mob to revolutionary patriots. Phillips was called up to reply, and poured forth a most scathing and eloquent rebuke. He opposed, 1839–40, the denial of equal rights to women in anti-slavery societies, and any divisions on the score of religious belief; also, any action of anti-slavery men as a political party. In 1840 he went as a delegate of the Mass. abolitionists to the World's Anti-Slavery Convention, London, and there advocated admission of women as members. In 1843–4 he was prominent in denouncing the compromises of the U. S. constitution, and then, and far into the 'fifties,' showed serene courage in speaking boldly in the face of threatened attacks of mobs. During the war he urged emancipation before it was proclaimed. For many years he was pres. of the Amer. Anti-Slavery Soc. In his latter years he advocated the cause of the Indians, penal reform, woman suffrage, greenback currency, and especially labor reform, opposing the wage and present financial systems. He was candidate of the labor-reform party for gov. of Massachusetts 1870. His last address was at the unveiling of a statue of Harriet Martineau in the Old South Church building, which is a memorial hall. As a speaker, he was quiet and graceful in manner, with great force of thought and language, and, on special occasions, manifesting a suppressed energy and feeling more effective than noisy action. He was almost universally conceded a high place among the most finished and impressive orators of the 19th c. At all times he was fearlessly outspoken. As a lecturer he was in great demand, on such subjects as the Lost Arts, and the life and work of Toussaint l'Ouverture and Daniel O'Connell.

He died in Boston. Besides his numerous contributions to anti-slavery periodicals, he published: *The Constitution a Pro-Slavery Compact* (1840); *Can Abolitionists Vote or Take Office?* (1845); *Review of Spooner's Unconstitutionality of Slavery* (1847); *Review of Webster's 7th-of-March Speech* (1850); *Review of Kossuth's Course* (1851); *Defence of the Anti-Slavery Movement* (1853); *Addresses* (1859); *Speeches, Lectures, and Letters* (1863). His life was published by George L. Austin, 1888.

PHIL'LIPS ACADEMY; Andover, Mass.: noted Eng. and class. school for boys; established by Judge Samuel Phillips, Jr. (q.v.), through the munificence of his father, and of John Phillips, LL.D. The early contributions of the Phillips family amounted to about $50,000. South Andover, instead of North (Judge P.'s native place), was chosen for ample space and opportunity of proper moral control. Ground was bought 1777, and increased to 187 acres; later, all 'Andover Hill' came under control of the trustees. An old carpenter shop, standing at the time of purchase, housed the first school, opened 1778, Apr. 30, accommodating 30 pupils. Within two years there were 60, and in its second decade the school attracted pupils from the whole country and from other lands. It was chartered 1780. The founder provided in its constitution that the master should instruct and establish the pupils in Christianity —a purpose since fulfilled. But, 1807, the 'Class in Theology,' which had educated young men for the ministry, became a distinct institution as a theol. seminary, the first of the kind in this country. A dept. for common-school teachers, antedating our normal schools, was opened 1830; but, 1842, for lack of funds, resolved itself into an Eng. dept. of the acad. The principals of P. A. have been distinguished for worthiness and thoroughness, especially Dr. Samuel H. Taylor, 1837–71. Between 9,000 and 10,000 boys were students in the academy during the first century of its existence, and its graduates have included very many eminent men. The academy offers two courses, a classical and a scientific, both four years in length. It takes high rank as a college preparatory school, most of the students going to Harvard or Yale. The buildings and equipment of the academy were valued at $450,000 in 1904; the buildings include Academy Hall, several dormitories, a gymnasium, a chemical laboratory, and the archæological building. In addition to the academy library (over 5,000 volumes in 1906), the students have access to the theological and memorial hall libraries. Needy students may have free tuition. The endowment is large, amounting in 1904 to $400,000. The faculty in the same year numbered 24, and the students 417. The Academy offers many prizes for proficiency in scholarship.

PHILLIPSBURG, *fil'ips-berg:* town in Warren co., N. J.; on the Central r.r. of New Jersey, the Lehigh Valley, the Delaware, Lackawanna and Western, and the Pennsylvania railroads, and on the Delaware river; 74 m. from New York. There are several churches, a good school system, weekly newspaper, and national banks. Iron manufacturing is conducted on an extensive scale. The Delaware is crossed by two railroad bridges. Easton, Penn., is on the opposite side of the river. Pop. (1900) 10,052; (1910) 13,903.

PHILLIPS EXETER ACADEMY: a secondary school for boys at Exeter, N. H. It was incorporated 1781, April 3, being the first educational institution to receive a charter from the legislature of New Hampshire, and opened 1783, May 1. It was endowed by John Phillips, for whom it was named, his gifts amounting to over $60,000. He provided that the trustees and teachers should be Protestants, and that the principal should be a member of a Christian church. The growth of the academy has been rapid, especially so in recent years; the endowment in 1904 amounted to nearly $400,000, and the buildings and equipment were valued at over $260,000. The buildings include the academy hall (the original building having been burned in 1870), Abbot Hall and other dormitories, a large dining hall erected in 1903, a gymnasium, a chemical laboratory, and a physical laboratory, excellently equipped and provided with a wood-working shop. The academy offers both a classical and a scientific course, and has a very high rank among the secondary schools of the country, particularly as a college preparatory school. There is a very efficient system of student self-government. The faculty in 1904 numbered 18, the students 390, 350 of whom were preparing for college.

PHILLPOTS, Eden: English novelist: b. Mount Aboo, India, 1862, Nov. 4. He was educated at Plymouth, England, and at the age of 17 went to London. He entered an insurance office there, meanwhile studying for the stage. In 1890 he gave up his business position, and devoted himself entirely to literature, making his permanent home at Torquay, Devonshire. He has written a number of novels, including *Down Dartmoor Way* (1894); *Lying Prophets* (1896); *Children of the Mist* (1898); *The Human Boy* (1899); *Sons of the Morning* (1900); *The Good Red Earth* (1901); *My Devon Year* (1903); *The Secret Woman* (1905). These have given him a place as the novelist of the Dartmoor country and its people.

PHILLYREA: see Phyllirea.

PHILO-. *fĭ-lo-*, Phil-, *fĭl-*, prefix [Gr. *philos*, loving]: fond of; affecting; cultivating.

PHILO.

PHILO, *fī'lo* (often called PHILO JUDÆUS, *fī'lo ju-dē'us*), *the Philosopher* (there being another Jewish Greek writer of this name): b. Alexandria about B. C. 20; d. about 40 A. D. Belonging to one of the wealthy and aristocratic families—his brother was the Alabarch Alexander—he received the most liberal education; and in a rare zeal for learning, he at a very early age had passed the ordinary course of Greek studies. Although every one of the different free sciences and arts included in the *Encyclika*, he says, attracted him like so many beautiful slaves, he yet aimed higher, to embrace the mistress of them all—Philosophy. Metaphysical investigation was the only thing which, according to his own confession, could give him satisfaction or pleasure. The extraordinary brilliancy of his style, which, by his contemporaries, was likened to that of Plato—his rare power of thought and imagination, with an erudition which displayed the most astonishing familiarity with all the works of the classical Greek poets and philosophers, while it made him an adept in history, geography, mathematics, astronomy, physiology, natural history, music, etc.—could not but be of vast influence both upon his co-religionists and those beyond the pale of his ancestral Jewish creed. He had completely mastered the literature of his nation; but, strange to say, he knew it, as far as it was Hebrew, chiefly from translations. Thus, the Bible was familiar to him through only the Septuagint version, with all its deficiencies. When about 40 years of age, he went to Rome as the advocate of his Alexandrian brethren, who had refused to worship Emperor Caligula in obedience to the imperial edict; of which embassy he has left an account. Of his life we know little except what is recorded above, and that he went once to Jerusalem. His second mission to Rome, to Emperor Claudius, on which occasion he is said to have made the acquaintance of the apostle Peter, as reported by Eusebius, rests on a legend of no historic value.

The religious and philosophical system of P., really the thing of consequence, is minutely known, and is deserving of profound study, on account of the vast influence which it has exercised both on the Jewish and on the Christian world. To understand his system aright, it is necessary to remember the strange mental atmosphere of his days; for a brief sketch of which, see GNOSTICS. The Alexandrines had endeavored to make Judaism palatable to the refined Greeks, by proving it identical with the grandest conceptions of their philosophers and poets, and had quite allegorized away its distinctive characteristics. P. was the first man who, though himself to a great extent imbued with allegorizing tendencies, made a bold and successful stand against this evaporization of the revealed religion of his fathers, which had led many Jews to throw off its yoke also outwardly. A most zealous champion of Judaism, his bitterness knows no bounds in rebuking those co-relig-

ionists who tried to defend their secret or overt apostasy by scoffing at the Law itself, who were 'impatient of their religious institutions, ever on the look-out for matter of censure and complaint against the laws of religion, who, in excuse of their ungodliness, thoughtlessly argue all manner of objections.' He cannot understand how Jews, 'destined by Divine authority to be the priests and prophets for all mankind,' could be found so utterly blind to the fact, that that which is the position only of a few disciples of a truly genuine philosophy—viz., the knowledge of the Highest One—had by law and custom become the inheritance of every individual of their own people; whose real calling, in fact, it was to invoke and to bring the blessing of God on all mankind, and who, when they offered up sacrifices 'for the people,' offered them up in reality for all men.

To P., the divinity of the Jewish Law is the basis and test of all true philosophy. Although, like his contemporaries, he holds that the greater part of the Pentateuch, both in its historical and in its legal portions, may be explained allegorically; and goes so far even as to call only the Ten Commandments, the fundamental rules of the Jewish theocracy, direct and immediate revelations from above, while the other parts of the book are to be ascribed to Moses—he yet holds Moses to be the interpreter specially selected by God, to whose dicta so far also Divine veneration and strict obedience are due; and again, that though many explanations of a metaphysical nature could be given to single passages, yet their literal meaning must not be tampered with. This literal meaning, according to him, is the essential part, the other explanations are mere allowable speculation—exactly as the Midrash and some church Fathers hold. Only his allegorical method differed so far from that of his contemporaries, that to him these interpretations—in which he did not disdain sometimes even to use the numbers symbolically, or to derive Hebrew words from Greek roots, and the like—were not a mere play of fancy, but to a certain extent a reality, an inner necessity. He clung to philosophy, as combined with the Law. If the former could be shown in one way or another to be hinted at in the latter, then only he could be that which all his soul yearned to be—viz., the disciple of both: a Greek, with all the refinement of Greek culture; and a Jew—a faithful, pious, religious Jew. He even urged the necessity of allegory from the twofold reason of the anthropomorphisms current in Scripture, and from certain apparent superfluities, repetitions, and the like, which, in a record that emanated from the Deity, must needs have a special meaning of their own, which required investigation and a peculiar interpretation. See Midrash: Haggada. Yet this fanciful method never for one moment interfered with his real object of pointing out how Judaism plainly and unmistakably was based upon the highest ethical principles.

His writings develop his ideas and his system in the

two directions above indicated. In that division of his writings, principally, which treats of the Creation (*Kosmopoia*), he allows allegory to take the reins out of his hands; but in that on the Laws (*Nomoi*), he remains remarkably sober and clear, extolling the Mosaic legislation throughout, at the expense of every other known to him. In a very few instances only he is induced to find any fault, or to alter slightly by way of allegory the existing ordinances.

His idea of God is pre-eminently religious, not philosophical. God alone is the real Good, the Perfect; the world has only an apparent existence, and is the source of all evil. God is to be imagined only as the primeval light, which cannot be seen as itself, but which may be known from its rays that fill the whole world. Being infinite and uncreated, He is not to be compared with any created thing. He has therefore no name, and reveals Himself only in designations expressive of this 'inexpressibility.' He is named also the Place (the talmudical *Makom*), because He comprises all space, and there is nothing anywhere besides Him. He is better than Virtue and Knowledge, better than the Beautiful and the Good (*Kalokagatheia*), simpler than the One, more blissful than bliss. Thus, he has, properly speaking, no quality, or qualities only negatively. He is the existing Unity or Existence itself (*On*, or $\breve{O}n$), comprised in the unpronounceable Tetragrammaton. As Creator, God manifests Himself to man, and He so doing is called 'the Beginning, the Name, the Word, the Primeval Angel.' In this phase of active revelation of God, which is as natural to Him as burning is to the heat, and cold to the snow, are observed two distinct sides, the Power and the Grace, to which correspond the two names Elohim and Adonai, used in the Bible. The *Power* also gives the laws, and punishes the offender; while the *Grace* is the beneficent, forgiving, merciful quality. Yet, since there is not to be assumed an immediate influence of God on the world—His infinite Essence being so different from the world's nature that a point of contact of the two cannot be found—an intermediate class of beings had to be created to stand between both, through whom He could act in and upon creation—viz., the spiritual world of ideas, which are not only 'ideals' or types in the Platonic sense, but are real, active Powers, surrounding God like a number of attendant Beings. They are His messengers, who work His will, and by the Greeks are called good demons (spirits); by Moses, angels. There are very many different degrees of perfection among them. Some are immediate 'serving angels,' others are the souls of the pious, of the prophets, and the people of Israel, who rise higher toward the Deity; others, again, are the heads and chief representatives of the different nations, not needed to mediate the presence of God to the people of Israel, since they have been taught and enabled to conceive and acknowledge the Everlasting Head of all beings, Himself. The

Logos comprises all these intermediate spiritual powers in His own essence. For P.'s views on this part of his system, which has been much discussed, see LOGOS. Man is a microcosm, a little world in himself, a creation of Logos, through whom he naturally participates in the Deity; or, as Scripture has it, 'he is created in the image of God.' Man stands between the higher and lower beings—in the middle of creation. The ethical principles of stoicism, P. identified with the Mosaic ethics, in which the ideal of character is the most exalted moral perfectibility or sanctity, and in which man's duties consist in veneration of God and love and righteousness toward fellow-men. P. holds firmly the belief in man's immortality. Man is immortal by his heavenly nature; but as there are degrees in his Divine nature, so there are degrees in his immortality, which deserves this name only when it has been acquired by an eminence of virtue. There is a vast difference between the mere existence after death, which is common to all mankind, and the future *life* of the perfect ones. Future recompense and punishment are not taken by P. in the ordinary sense of the word. Virtue and sin both have all their rewards within themselves; but the soul, which is 'pre-existing,' having finished its course in the sub-lunar world, carries this consciousness with it in a more intense and exalted manner. Paradise is Oneness with God; there is in the Philonic system no hell with bodily punishments for souls without a body, and no Devil.—Philo's Messianic notions are vague in the extreme, and he partly even interprets certain scriptural passages alluding to some future Redeemer as referring to the soul. Yet he indicates his belief in a distant time when some hero will arise out of the midst of the Jewish nation, who will gather together all the dispersed; and these, purified by long punishments, will thenceforth form a happy, sinless, most prosperous community, with which all the other nations will be eager to unite.

The above indicates in the slightest of outlines the principal features of P.'s theology and philosophy, without endeavoring to follow any one of the manifold systematic schemes into which his scattered half-obscure dicta have been pressed. The influence of P. on Christianity and Judaism (in whose later writings his name occurs as 'Yedidyah the Alexandrine') is enormous: see various titles (GNOSTICS: JEWS: LOGOS: ETC.). For what he has done in the development of philosophy, see PHILOSOPHY: PLATO: NEO-PLATONISM: ETC. Of the many works left under his name, several have been declared spurious, but in some cases with little show of reason. His writings are generally brought under three chief divisions, the first comprising those of a more general and metaphysical nature, e.g., *De Mundi Incorruptibilitate*, *Quod Omnis Probus Liber*, *De Vita Contemplativa*. The second contains those in defense of his compatriots, *Adversus Flaccum*, *Legatio ad Caium*, *De Nobilitate*. The third and most important deals with the interpretation

and explanation of Scripture in the philosophical manner indicated, *De Mundi Opificio, Legis Allegoriarum Libri III.;* containing also a number of special treatises, *De Circumcisione, De Monarchia, De Præmiis Sacerdotum, De Posteritate Caini, De Cherubim*, etc.; five books *On the History of Abraham, De Josepho, Vita Mosis, De Caritate, De Pœnitentia*, etc.; to which also belong *De Parentibus Colendis, De Virtute eiusque Partibus*, published first by Cardinal Mai; and certain very doubtful fragments, discovered first in an Armenian translation, e.g., *De Providentia, De Animalibus*, etc. Many of his works, however, seem irredeemably lost. The *editio princeps*, by Turnebus, dates Paris 1552; reprinted Geneva 1613; Paris 1640; etc. Mangey published a more critical ed. (Lond. 1742 in 2 vols. fol.), and Richter a slightly improved one (Leip. 1828–30 in 8 vols). An ed. of Pfeiffer (1785, etc.) remained incomplete. Another ed. was published by Tauchnitz (1851, etc.). As yet, there are several codices in the Escurial, in Rome, in St. Petersburg, which have never been collated, and which promise, to judge from the few readings known, to furnish an immense help for that really critical edition which as yet is a desideratum.—Among the scholars who have written on Philo are Dahl, Bryant, Gfrörer, Creuzer, Grossmann, Wolff, Ritter, Beer, etc. The Eng. transl. of Philo, 4 vols., forms part of Bohn's *Ecclesiastical Library*. A new edition of Philo has been prepared by Cohn-Wendland. The best monograph is Carl Siegfried, *Philo von Alexandria* (1875).

PHILO BYBLIUS, *fī'lō bib'lĭ-ŭs*, HERENNIUS: Phœnician grammarian: b. Byblos, Phœnicia; flourished between 64 and 141 A.D. He is the author of a famous historical work, *Concerning Cities and Their Renowned Citizens*. It is in 30 books and has proved the thesaurus of later grammarians. He also executed a translation of the alleged work of Sanchoniathon, of which some fragments have survived, and have been published in the third volume of Müller's *Fragmenta Historicorum Græcorum*, Vol III. The alleged complete text of Sanchoniathon, which was discovered in a Portuguese monastery and published by Wagenfeld (1837), proved to be a forgery.

PHILOLAUS, *fĭl-ō-lā-ŭs:* Pythagorean philosopher; according to Plato he was a contemporary of Socrates, and was born in Magna Græcia. He left Metapontum on account of political disturbances and entered Lucania. Later on he visited Thebes. The teachings of Pythagoras were for the first time committed to writing by him. The only fragments of this work which are extant Böckh in his *Philolaus des Pythagoräers Lehren, nebst Bruchstrücken seines Werkes* (Berlin 1819), declares to be genuine. Their genuineness has, however, been denied by Schaarschmidt, in his *Die angebliche Schriftstellerei des Philolaus* (Bonn, 1864). Some of them are undoubtedly authentic, others spurious.

PHILOLOGY, n. *fĭl-ŏl′ŏ-jĭ* [Gr. *philologĭa*, the love of disputing, the love of literature—from *philos*, loved; *logos*, a word, discourse]: science of words and language; all studies immediately connected with words and language, applied thus to ethnography and history in their linguistic relations, but applied directly to etymology and grammar. PHILOLOGICAL, a. *fĭl′ō-lŏj′ĭ-kăl*, pertaining to or connected with philology. PHIL′OLOG′ICALLY, ad. *-lĭ*. PHILOLOGER, n. *fĭl-ŏl′ŏ-jĕr*, or PHILOL′OGIST, n. *-jĭst*, one versed in philology.—*Philology*, as a technical name for a branch of knowledge, has passed through various phases of meaning. Signifying originally the love of talk or discourse, then, in a more restricted sense, the love of philosophical conversation such as is exhibited in the dialogues of Plato, P. came, in later Greek literature, to mean the study and knowledge of books, and of the history and other science contained in them. In this sense it passed over to the Romans, under whom the name of philologists was applied to men distinguished for universal learning, more especially to the *Grammatici*, whose chief occupation of editing and illustrating the classic poets naturally led them to this multifarious knowledge; and when Martianus Capella (q.v.) in the 5th c. composed his Encyclopedia (q.v.) or curriculum of education, embracing the 'seven liberal arts' (Grammar, Dialectic, Rhetoric, Music, Arithmetic, Geometry, and Astronomy), he designates the collective whole by the name of philology. What is known as the Revival of Literature after the dark ages is nothing else than the revival of the ancient P. But when men, instead of looking only at what had been written, began to examine the world for themselves, and enlarge the bounds of science, it became impossible for one man to cultivate the whole round of knowledge, and the term P. was by degrees restricted to a knowledge of the languages, history, laws, etc., of the ancient world (by which the Greek and Roman world chiefly was thought of), or more narrowly still, to the study merely of the languages —of grammar, criticism, and interpretation. A more complete conception of P., as an independent branch of knowledge, was that of F. A. Wolf, who assigned as its field all that belongs to the life of the ancient peoples; and the conception is still further extended by Böckh, who makes it almost synonymous with history—its problem being the reproduction of the past; in this sense, the word is applicable to all peoples at all periods of their history, so that we are beginning to have an Indian P., a German P., a Slavic P., no less than a classic P. The fullest and most systematic exposition of what P. in this sense ought to embrace, has been given by G. Haase in Ersch and Grüber's *Encyc.*, 3d sec., XXIII. The following is an instructive outline by Prof. W. D. Whitney of Yale Univ., in *Encyc. Brit.*, 9th ed.: 'How and for what purposes to investigate the literature of any people (philology in the more proper sense), combining the knowledge thus obtained with that derived

from other sources; how to study and set forth the material and structure and combinations of a language (grammar), or of a body of related languages (comparative grammar); how to co-ordinate and interpret the general phenomena of language, as variously illustrated in the infinitely varying facts of different tongues, so as to exhibit its nature as a factor in human history, and its methods of life and growth (linguistic science)—these are what philology teaches.'—See titles of various countries and races, with their literature and dialects.

Of P., even in its widest sense, the study of language was always, and necessarily, a fundamental part; and, in the usual sense of the word, it has been the chief part —often nearly the whole. For a long time after the revival of learning, the classic writers were studied chiefly for their language and style, and those of them that did not meet an imaginary standard of purity were despised and neglected, however valuable they might be for their matter. But though great and even undue attention was thus given to language, it was only as an instrument, as means to an end. The philologist studied a language in order to be able to understand it and use it—to get at the thoughts conveyed in it, or to convey his own thoughts with force and elegance to others. This is the object of the grammars, dictionaries, annotated editions, and criticisms, which constitute the chief part of philological literature. But within recent years, P. has entered on a new phase, or rather a new field of study has been added to the old. As the naturalist investigates a class of objects not with a view to turn them to use, but to understand their nature, and classify them, so the modern school of philologists examine and compare the structures of the various languages, and arrange them in classes and families, with the ultimate view of arriving at some theory of language in general—its mode of origin and growth. The comparison of the structure of two or more languages is called Comparative Grammar, and the whole of this new branch of study is sometimes designated Comparative P.; but it seems better to leave the old field in possession of the old name, and in distinction from P., as the practical knowledge of languages, to speak of the study of language as a phenomenon *per se*, as the Science of Language. The German term *Sprachenkunde*, and the French *Linguistique*, have more especial reference to the naturalist or classificatory aspect of the study.

So long as the view prevailed that language was a human invention, anything like a science of it was impossible. According to that view, early started, and elaborated and discussed especially by Locke, Adam Smith, and Dugald Stewart, it was only after men found that their rapidly increasing ideas could be no longer conveyed by gestures of the body, and changes of the countenance, that they set about inventing a system of artificial vocal signs, whose meaning was fixed by mutual agreement. On this theory, there might be a his-

tory of the subsequent course of the different languages, but inquiries into the nature and laws of language after the manner of the physical sciences would be absurd. In opposition to the philosophers who attributed the origin of language to human invention, some theologians claimed a Divine origin for it, representing the Deity as having created the names of things, and directly taught them to Adam. Both these theories may now be considered as given up by all who are entitled to speak on the subject. Everything, in fact, tends to show that language is a spontaneous product of human nature—a necessary result of man's physical and mental constitution (including his social instincts), as natural to him as to walk, eat, or sleep, and as independent of his will as his stature or the color of his hair.

Language was an object of speculation among the Greek philosophers; but as was the case with their inquiries into the outward world generally, they began at the wrong end; they speculated on the origin of things before they had examined the things themselves. They knew no language but their own, and all others were indiscriminately classed as 'barbarous' or foreign; they had no test of affinity among tongues except mutual intelligibility. The theories of the modern philosophers of the 18th c. were nearly as baseless; they were mere *a priori* speculations, akin to Burnet's (q.v.) 'theory of the earth'—a theory constructed before the strata of the earth's crust had been explored. The great obstruction to the true course of inquiry was the assumption, made first by the church Fathers, and for a long time unquestioned, that Hebrew was the primitive language of man, and that therefore all languages must be derived from Hebrew. A prodigious amount of learning and labor was wasted during the 17th and 18th c. in trying to trace this imaginary connection. Leibnitz was the first to set aside this notion, and to establish the principle that the study of languages must be conducted in the same way as that of the exact sciences, by first collecting as many facts as possible, and then proceeding by inductive reasoning. It was owing to his appeals and exertions that missionaries, travellers, and others, began to make those collections of vocabularies and specimens of languages and dialects which form the *Herbarium*, as it were, of human speech. A valuable Catalogue of Languages, six vols., in Spanish, was published 1800 by Hervas, Jesuit missionary: it contains specimens and notices of more than 300 languages, and many of the true affinities are happily traced. A similar work was Adelung's *Mithridates* (4 vols. Berlin 1806–17), based on the catalogue of Hervas, also on the collections which the Russian govt. had caused to be made. In none of these efforts, however, though much truth was brought out, were there any fixed principles of scientific classification. The light that brought order into the chaos rose with the study of Sanskrit (q.v.), made accessible to European scholars first by Sir William Jones, Cole-

brooke, and other members of the Asiatic Soc., founded Calcutta 1784. The similarity of Sanskrit to Greek and Latin, especially in the grammatical forms, struck every one with surprise. Sir William Jones declared that 'no philologer could examine the Sanskrit, Greek, and Latin without believing them to have sprung from the same source, which perhaps no longer exists. There is a similar reason, though not quite so forcible, for supposing that both the Gothic and the Celtic had the same origin with the Sanskrit. The old Persian may be added to the same family.' Rather than admit this relation, which it was seen would involve also ethnological affinities, some, as Dugald Stewart, denied that Sanskrit had ever been the language of a people, and held that it was an invention of the Brahmans, who had constructed it on the model of the Greek and Latin. Fr. Schlegel's work, *On the Language and Wisdom of the Indians* (1808), though defective and erroneous in scholarship, had the merit of boldly embracing the languages of India, Persia, and Europe in one family group, by the comprehensive name Indo-Germanic. It was this work that called the attention of German scholars to a field of labor which they have since made specially their own.

The successive publications of Bopp (q.v.), beginning 1816, culminating in his great work on the grammar of the Aryan languages, *Vergleichende Grammatik* (Berl. 1833–52; 2d ed., recast and enlarged, 3 vols. Berl. 1857; Eng. transl. of 1st ed., 3 vols. 1845–50, revised 1854), were actually epoch-making: they created the new science of Comparative Grammar and laid a sure and broad foundation for a science of language generally. Concurrent with the labors of Bopp were those of Pott in his Etymological Researches (*Etymologische Forschungen*, 2 vols., 1833–36; 2d ed. 1859) and other works. Not less important, though confined to one stock of the Aryan family, the Teutonic, was the great German Grammar (*Deutsche Grammatik*, 4 vols. 1818–37) of J. Grimm (q.v.). William von Humboldt (q.v.) did much to establish a philosophy of language—the relations and interactions of mind and speech; a department of the subject further cultivated in recent years by Steinthal. The method of investigation, thus invented and perfected in the field of the Aryan tongues, has been applied to other languages, and considerable progress has been made in grouping the principal varieties of human speech into families, which again fall into sub-divisions or branches, according to the different degrees of nearness in the relationship. In establishing these relationships, though a comparison of the vocabularies—the numerals, pronouns, and more essential nouns and verbs—may establish a general affinity, and render a common origin probable, yet the surer test is in the grammatical forms. For when those elements of a language which express the relations of things—case, number, tense—have once become mere terminations, and lost their original form and independent meaning, they can be trans-

mitted only by tradition; and when the same grammatical forms are found possessed in common by two or more tongues, they must be an inheritance from a common ancestor. It follows from this that the 'genealogical' classification, as it is called, cannot be carried out with great surety or rigor except in the case of languages in which grammatical forms had become in some degree fixed before their divergence—i.e., except in the case of the inflectional languages. Accordingly, the only two well-defined genealogical families are the Aryan and the Semitic, which embrace all the languages of the inflectional type.

Besides the division of languages into families bearing traces of a common origin, there is a division into three orders, as they may be called, depending on radical difference of structure. Speech, as the expression of thought, contains two elements: ideas or conceptions, which constitute the substance or material part; and the relations of these ideas to one another, which constitute the formal part; and the nature of a language depends on the particular way in which the vocal expression of these two elements is combined. At the foundation of all words lie Roots (q.v.), or simple sounds expressive of meaning. Now, some languages, e.g., the Chinese (q.v.), use these roots in their naked form as words, the same syllable, according to its position, serving as noun, adjective, verb, etc.—e.g., *ta* means great, greatness, to be or to make great, greatly or very. The relational part of the thought mostly gets no vocal expression; it is only indicated by position, as when *min*, people, and *li*, power, are simply put together (*min li*) to signify the people's power. Relations not readily indicated by position are expressed in a round-about way by using additional significant words: thus, *tschung* (mass or multitude) *jin* (man) = men; *niu* (woman) *tsè* (child) = daughter; *y min li* (employ people power) = with the people's power. Even in such cases, each root preserves its independence, and is felt to express its own radical meaning. Languages like the Chinese, whose development has been arrested at this rudimentary stage, are called *Monosyllabic* or *Isolating*.

The next stage of development is that of the *Agglutinate* languages, by far the most numerous, including the Turanian and American families. In these, the relational part of thought obtains prominent vocal expression by separate roots joined or *glued* on to the significant roots as terminations. These terminations were originally themselves significant roots, and many of them are used still as separate significant words, though the greater part have sunk down to mere signs of cases and other relations. The compound expression thus formed never, however, attains perfect unity; the significant root always remains rigid, unobscured in its sense, and unchanged in form, and the termination is felt as something distinct from the body of the word.

Thus, the Finnish declension exhibits a structure of

the most mechanical and transparent kind—e.g., *karhu*, bear; *karhu-n*, of the bear; *karhut-ta*, without bear; *karhu-sta*, out of the bear; and so on through 15 cases. The insertion of the plural suffix, *i*, gives *karhu-i-n*, of the bears; *karhu-i-ta*, without bears; *karhu-i-sta*, out of the bears; etc. But this composite mechanical structure reaches its climax—remaining all the while perfectly transparent—in the Turkish verb. Thus, the root *sev* has the indefinite meaning of loving, and the inf. is *sev-mek*, to love; which then, by the insertion of certain suffixes, can take on as many as 40 forms or voices—e.g., *sev-me-mek*, not to love; *sev-e-me-mek*, not to be able to love; *sev-dir-mek*, to cause to love; *sev-dir-ish-mek*, to cause one another to love; *sev-il-mek*, to be loved; *sev-il-e-me-mek*, not to be able to be loved; etc. Each of these forms, then, runs through a large round of tenses and moods, with their persons and numbers.

The languages of the American Indians all are of this agglutinating type, though they have got also the name Incorporative or Intercalative, because they run a whole phrase or sentence into one word—e.g., *hoponi*, to wash; *hopocuni*, to wash hands; *hopoaduni*, to wash feet; *ninacaqua*, I (*ni*) eat (*qua*) flesh (*naca*). The Basque language partakes of this character.

It is only in the third or *Inflectional* stage that perfect unity of the two elements is attained. In the Aryan and Semitic tongues, which alone have reached this highest state of development, the significant root and the termination have become blended into one both in effect and form, and phonetic changes have mostly obliterated the traces of composition. Yet no doubt is felt by philologists that the most highly organized of the inflecting or amalgamating languages began with the radical stage, and passed through the agglutinate. The analytic powers of comparative grammar have succeeded in tracing back the formal elements of the Aryan tongues to original independent words, agglutinated to other words to modify them: see INFLECTION. Against this theory it has been urged that there is no historical instance of a language so changing its type, and passing from one stage to another. But a sufficient account of this phenomenon may be found in the different mental habits and political positions of the peoples (see Max Müller, *Lectures on the Science of Language*, First Series, 316). Besides, the languages of the lower types do show a tendency, under favorable circumstances, to produce grammatical forms of the higher kind. Even in Chinese, in some of its modern dialects, something like cases is seen; and Finnish and Turkish, in contact with the inflected languages of Europe, are making approaches to the inflectional type.

On the other hand, the inflectional languages had, before the earliest times of which we have any written monuments, entered on the reverse phase—the *analytic*. By the process of phonetic change and decay, the grammatical forms have been gradually becoming obliterated

and losing their power, and their place has been supplied by separate words in the shape of prepositions and auxiliary verbs: see INFLECTION.

Connected with these radical differences of type is one of the higher and more speculative problems of the science—the question as to the common origin of all languages. The inherent and apparently ineffaceable difference of structure in the three orders above described, as well as the absence of all sure marks of genealogical affinity even between the two families of the inflectional type, the Aryan and the Semitic, are considered by some as insuperable objections to the theory of a common origin. But though it may be fruitless to look for extensive identifications of the roots and grammatical forms of the Aryan tongues, even in the oldest forms to which we can trace them, with those of the Semitic, still more with Chinese or Turkish elements, it seems rash and unscientific to affirm that, going back to the radical stage, the development of all could not have begun from a common stock of monosyllabic roots. The wonderful transformations exhibited by language in the course of its known history seem sufficient ground for maintaining the *possibility* of origin in a common stock. On the other hand, the nature of the case forbids hope of ever being able to *prove* it; for the coincidences that occur (e.g., Chinese *fu*, Tibetan *pha*, Lat. and Gr. *pa*-ter, Eng. *fa*-ther; Chin. *mu*, Egyp. *mu*, Lat. and Gr. *ma*-ter, Eng. *mo*-ther) might arise from the mind and vocal organs of man being everywhere essentially the same.

Languages, like living organisms, are in a state of continual flux, and an essential part of the science consists in investigating the laws according to which these changes take place. It is because there are such laws that a science of language is possible. In tracing words to their origin, and identifying them with words in other languages, we are guided no longer by mere similarity of sound; on the contrary, identity of sound is often a proof that a proposed etymology is wrong. It has been established, e.g., by induction (see GRIMM'S LAW), that *c* in Latin is regularly represented by *h* in Gothic and English; while for Gothic or English *c*, the corresponding letter in Latin is *g*. Accordingly, we readily recognize Lat. *corn-u* and Eng. *horn* as cognate words; while a suggestion to connect the Eng. *corn* with Lat. *cornu* is immediately rejected. If *corn* has a representative in Latin, it must begin with *g*, which points out *granum* as the word. *Grain* is not the Eng. representative of *granum;* it *is* granum, borrowed from the Latin through the French. The expert etymologist can often identify with certainty two words, though not a letter remains the same. In simple cases, this is done by every one. Who, for instance, doubts that Aberdeenshire *fa*, *filk*, are merely dialectic varieties of Eng. *who*, *which?* Yet the same persons who readily admit such cases are skeptical when it is proposed, for instance, to identify Fr. *larme* with Eng. *tear*. The grounds of identification,

however, are similar in both instances; the only difference being that, with regard to *larme* and *tear*, they require to be traced historically. No one will dispute that *larme* is a corruption of Lat. *lacrima;* in fact, it can be followed through the successive stages of change. Now we know that the Romans had a peculiarity of letting *d* in some positions degenerate into *l*. Nor is this unaccountable, when we consider that the contact of organs which produces *d* differs from that which produces *l* chiefly in being more energetic; a slovenly *d* slides into *l*. Thus the Greek name Odysseus became in the mouth of the Romans Ulysses; they said *odor* (a smell), but *oleo* (I smell); and, instead of *impedimentum*, *dedicare*, we sometimes find *impelimentum*, *delicare*. These and other instances would warrant us to conclude that *lacri-ma* was a corruption of *dacri-ma* (corresponding to Gr. *dakru*), even if we had not the express statement of Festus that *dacrima* was the older form. After this there is no difficulty in recognizing *dacri*, or *dakru*, as identical with Gothic *tagr*, Eng. *tear*.

In order to give a rational account of the phonetic changes now exemplified, the nature of articulate sounds, and of the organs that produce them, must be carefully investigated. The most valuable contributions, in English, to this important preliminary branch of the study (called *Phonetics*), are those of Alexander J. Ellis, and of Melville Bell, in his book *Visible Speech:* see PHONETIC WRITING: VISIBLE SPEECH. A *résumé* of the subject, with diagrams of the organs of voice in the position of pronouncing the different articulations, is given in the second series of Max Müller's *Lectures on the Science of Language*.

The transformations that words exhibit, as they are traced down the stream of history, are of the nature of phonetic decay, and are due to a natural tendency to economize muscular exertion by pronouncing two syllables in one. The dropping of inflections, the shortening of words by internal elision and otherwise (Fr. *père*, from Lat. *pater;* Eng. *fair*, from AS. *fæger; stranger*, from old Fr. *estrangier*, Lat. *extraneus*), all are due to the action of this force; and the uniformities observable among such changes can be explained on physiological principles. Dialectic diversification is not so easily accounted for; it is difficult to say why sister nations—as in the case of the Aryan family, or of the nations speaking Romanic tongues—should have given such different forms to the same stock of primitive roots; why, e.g., Gr. *pente* (Æol. *pempe*), *pepo*, should be in Lat. *quinque*, *coquo*. Max Müller thinks it necessary to go back to a time when many of the articulations were not yet sharply defined; and he appeals, in illustration, to the confusion children make between such sounds as *tat* and *cat;* and, what is still more in point, to the analogy presented by languages like the Polynesian. In the language of the Sandwich Islands, the two consonants *k* and *t* run into one another, and it seems impossible for a foreigner to say whether

what he hears is a guttural or a dental. The same word is written by Prot. missionaries with *k*, by French with *t*. It takes months of patient labor to teach a Hawaiian youth the difference between *k* and *t*, *g* and *d*, *l* and *r*. . . . If colonies started to-morrow from the Hawaiian Islands, the same which took place thousands of years ago, when the Hindus, the Greeks, and Romans left their common home (see ARYAN), would take place again. One colony would elaborate the indistinct, half-guttural, half-dental contact into a pure guttural; another, into a pure dental; a third, into a labial.' Much light is thrown on this question by those phonetic peculiarities—those deficiencies and predilections of articulation—which characterize whole tribes and nations, as they often do individuals. They may have originated, perhaps, in the idiosyncrasies of individual ancestors (a lisping patriarch might produce a tribe of lispers, without their inheriting the physical defect which caused the lisp in him), or in a common habit of the organs of speech produced by external circumstances; but once established, they are very persistent and influential. The Mohawks, and several other American tribes, have no *p*, *b*, *m*, *f*, *v*, or *w;* they never articulate with their lips. In Chinese, there is no *d;* *r* also is lacking; and as the habit of the language requires a vowel after every consonant, the nearest approach that they can make to the sound of *Christ* is *Ki-li-se-tu*. An analogous habit of articulation transforms the English word *gold* in the mouth of a Kafir into *i-go-li-de*. On this principle can be explained the Fr. *espérer*, from Lat. *sperare; establir* or *établir*, from *stabilire; école* (*escole*), from *schola*, etc. In the Celtic tongue, an initial *s* with a consonant after it was an unwonted combination; when it would have occurred, a vowel was always prefixed; and, on adopting the Latin language, the Celtic peoples carried their old habit of pronunciation with them. The effects on a language of such contact with another are important elements in its history. See ENGLISH LANGUAGE: ENGLISH LITERATURE.

The positive part of the science of language, having pushed inquiry back until it arrives at monosyllabic roots that admit no further analysis, there stops as at the legitimate boundary of its province. It assumes the existence of a certain store of crude or primary matter, and merely concerns itself with how out of this matter the structure, as we know it, has been built or has grown up. But a question remains, which, though it can never receive other than a conjectural answer, has wonderful fascination for the speculative mind, and was in fact the question with which all inquiries into language began; the question, namely: How did language take a beginning at all? How came this primitive material of language, these significant roots, into existence? The answer may be thus conceived: To speak is a necessity of man's rational and emotional nature; he speaks because he thinks and feels, and is necessarily associated with

others who think and feel. When the mind receives an impression or intuition, by an instinctive impulse, of the nature of reflex action, some outward expression—a gesture or vocal sound—breaks forth, which by association becomes a sign or symbol, to the individual and to his associates, of the impression or idea that gave it birth. Associated at first with individual impressions and objects, these sounds, by the process of abstraction, which is pre-eminently a human faculty, would gradually come to represent more generalized impressions—would become words, as distinguished from mere animal sounds. The necessity of words to think in is much insisted on by speculators on this subject, as being the motive-power in the generation of language; and no doubt it is true that, without language, thought could advance but little, if at all, beyond what is manifested by the brutes. But when they argue as if this necessity of having a man's ideas objectively depicted, in order to exercise his own reason, would impel an individual man to construct a language for his own use, they make the unwarranted assumption that, under any circumstances, even though he grew up from infancy in solitude, the thinking powers of a human being must necessarily develop themselves. The necessarily few facts that bear on the case look the other way. Kaspar Hauser (q.v.), instead of elaborating a system of symbols of thought for himself, had forgotten what he had once possessed; his faculties both of thought and of speech seem to have been simultaneously arrested. Observation seems to favor the opinion, that man in solitude—if he could exist in solitude—would be as mute as the lower animals. The social nature of man helped to give birth to the germs of speech, no less than his rational nature; an instinctive desire to give a sensible sign of his impressions to his fellows was perhaps the primary impulse; the aid thus given to his own thinking powers, a secondary result. Be this as it may, it seems reasonable to assume, as it has been well put by Steinthal, that 'at the origin of humanity, the soul and the body were in such mutual dependence, that all the emotions of the soul had their echo in the body, principally in the organs of respiration and the voice. This sympathy of soul and body, still found in the infant and the savage, was intimate and fruitful in the primitive man; each intuition woke in him an accent or a sound.'—Farrar, *Origin of Language.*

Were these sounds, then, guided by chance or caprice? or if not, what determined particular articulations to be associated with particular objects or ideas? Any mystic innate correspondence between sounds and things is out of the question; but what more reasonable than to suppose that the natural sounds emitted by so many things animate and inanimate, should suggest the character of the articulations which the ideas of the things called forth—not so as to produce exact imitations, which it is not of the nature of articulate sounds to be, but such

resemblances as would suffice for association? See ONOMATOPŒIA. In the case of ideas unconnected with any natural sound, names would readily be suggested in many cases by analogies real or fancied with things that were attended by sounds. We can see, again, a physiological fitness in the articulation *sta*, to stand, with the idea of stability; with the attitude, the organs involuntarily assume the position with which this syllable is emitted. Similar instances might be multiplied. We are not to suppose that the same thing would suggest the same sound to all, or even to the same individual at all times. The language-making faculty in the flush of its spring would throw out a multitude of names for the same thing (synonyms), as well as apply the same name to many different things (homonyms); but by a process of natural elimination, those only would survive that were felt best to answer the purposes of speech. The abstracting faculty would also soon dissociate them from the concrete individual objects that first suggested them, and convert them into symbols of the prominent attributes of whole classes. It is these generalized names, syllables significant of such general simple notions as seeing, moving, running, shining, striking, cutting, or being sharp, that, by a kind of inverse process, became the roots of language as it now exists. A syllable expressive of a single prominent attribute forms the foundation of the names of a whole class of objects, the specific differences being marked by other significant syllables joined on to it: see ROOT. In some such way, by the unconscious working of man's intellectual nature, we may conceive language to have grown out of the exclamatory or interjectional stage into the rational structure that we now admire. This theory of the origin of roots, together with the constant operation of phonetic change, accounts for the absence of all traces of onomatopœia in the great bulk of the words of a language, and seems to meet the objections of Max Müller and other philologists to the onomatopœic theory.

With regard to these primary or radical words it is necessary to observe here only that they all are significant of sensible or physical ideas, and that expressions for immaterial conceptions are derived from them by metaphor. For the growth, from a comparatively few roots of this kind, of the vocabulary of the richest language, see, further, ROOT.

Another speculative question regards the length of time that language must have taken to advance from the rudimentary stage to the state in which it is found in the earliest records. Bunsen assigns 20,000 years as the lowest limit; but the same uncertainty must rest on this question as on the corresponding one in geology.

For separate points of philology, see a variety of titles. See—besides the titles above referred to—ALPHABET: the several letters, A, B, etc.: GENITIVE: NOUN: ADVERB: PRONOUN: DIALECT: PERSIAN LANGUAGE AND LITERATURE: SHEMITIC LANGUAGES: ETC.

The literature of the new science of language is already rich; but much of it is scattered through the transactions of societies and periodicals. Of separate works of comprehensive kind, in addition to those above named, consult, in German, Schleicher, *Die Sprachen Europas* (Bonn 1850), and *Vergleichende Grammatik der Indo-Ger. Sprachen* (2 vols. Weimar 1861); J. Grimm, *Ueber den Ursprung der Sprache* (Ber. 1852); Diez, *Etymol. Wörterbuch der Romanischen Sprachen* (2d ed. Bonn 1861), and *Vergleichende Grammatik der Romanischen Sprachen* (3 vols. Bonn 1836–42), and Eng. transl. of both works, pub. by Williams and Norgate (1864); Heyse, *System der Sprachwissenschaft* (Ber. 1856); Steinthal, *Die Classification der Sprachen* (Ber. 1856); and *Der Ursprung der Sprache* (Ber. 1851). In French, Renan, *Histoire Générale et Système comparé des Langues Sémitiques* (3d ed. Paris 1863), and *De l'Origine du Langage* (3d ed. Paris 1863); Pictet, *Les Origines Indo-Européennes* (Paris 1859).

English scholars were late in entering this field of research. Horne Tooke's (q.v.) *Diversions of Purley*, though a work of genius, and the means of first awakening in many minds an interest in the nature of language, was written without sufficient acquaintance with the kindred tongues, and before the true key to the inquiry had been obtained: therefore few of its results can now be accepted. Among the first important contributions were Prichard's *Eastern Origin of the Celtic Nations* (Oxf. 1831), and the contributions of the Rev. Richard Garnett to the *Quarterly Review* 1835–48: these essays in the *Quarterly*, and subsequent papers by the same writer in the proceedings of the London Philological Soc. (in whose formation 1842 he was active), have been reprinted under the title *Philological Essays* (Williams and Norgate 1859), and are models of linguistic research. The philological articles of the *Penny Cyclopædia* also contributed to popularize the study in England. Of substantive works, the most important, though bearing more directly on the Greek and Latin tongues, are *The New Cratylus* (1839, 3d ed. 1859), and the *Varronianus* (1844) of J. W. Donaldson (q.v.). Winning's *Manual of Comparative Philology* (1838) had previously given a popular sketch of the affinities of the Aryan languages. Latham's *Elements of Comparative Philology* (1862) gives an elaborate classification of the languages of the world, with specimens; only a small part of the work is given to the general principles of the science. Farrar, *On the Origin of Language* (1860), deals chiefly with the speculative part of the subject; in *Chapters on Language* (new ed. 1873), he defends his original positions; his *Families of Speech* (new ed. 1873) deals with classification. The writings of Max Müller (*Comparative Mythology* in *Oxford Essays* 1856; *Lectures on the Science of Language*, 1861; second series 1864; new ed. of both 1871) went far to cause this science to take root in Britain and the United States. The principles of linguistic science are set forth in Whitney's *Language and the Study of Lan*

guage (1868), and *The Life and Growth of Language* (1875). Other recent works are: Sayce's *Principles of Comparative Philology;* Sweet, *The Hist. of Language* (1900); Oertel, *Lectures on the Study of Language* (1901); Giles, *Manual of Comparative Philology* (2d ed., 1901).

The chief languages of the earth may be thus arranged:

I. *Monosyllabic or Isolating.*—1. Chinese, the typical language of this order. 2. Tibetan, which shows some beginnings of grammatical forms. 3. The languages of the Eastern Peninsula—Siamese, Anamese, Burman, Japanese and the language of Corea are doubtful.

II. *Agglutinate.*—1. The most important division of this order is the Turanian family, comprising 'all languages spoken in Asia and Europe (including Oceania), and not included under the Aryan and Semitic families, with the exception of Chinese and its cognate dialects.' For the sub-divisions of this family, see TURANIAN LANGUAGES. 2. *African Languages.*—Some of the languages of Africa are allied to the Semitic family, and were introduced by immigration, e.g., the dialect of Tigré in Abyssinia (see ETHIOPIA), and the Arabic dialects spoken by the Mohammedan population of the coasts, and which have even penetrated deep into the interior. How far the Berber dialects are of Semitic character is a disputed question; and the same is the case with the language of the Gallas in Abyssinia. The Egyptian, from which the modern Coptic is derived, seems never to have grown beyond the isolating stage (See HIEROGLYPHICS). Some of the languages adjoining Egypt are thought to be allied to the Coptic. The negro languages, properly so-called, of the Sudan, and of the w. coast from the Senegal to the Niger, are exceedingly numerous and widely diverse. The languages s. of the equator are markedly different from those north. They fall, according to some, into two great families, the Congo family on the w., the Kaffir family on the e. The Hottentot language is distinct from both. A valuable contribution has recently been made to the study of part of the field by Bleek's *Comparative Grammar of the South African Languages* (1862). 3. *The Languages of the American Indians.* The native languages of the new world are numbered by many hundreds, all differing totally in their vocabulary, yet agreeing in the peculiar grammatical structure which has given the name Incorporative (see above). Their area is now contracting.

III. *Inflectional.*—This order consists of two families, the Aryan and the Semitic, so distinct in their grammatical framework that it is impossible to imagine a language of the one family derived from one of the other. It is the peoples speaking these languages that have been the leaders of civilization within the historic period. The sub-divisions of these families are shown in the accompanying tables, from Max Müller's Lectures.

PHILOLOGY.

No. I.—Genealogical Table of the Aryan Family of Languages.

Living Languages.	Dead Languages.	Branches	Classes.		
Dialects of India, The Gypsies,	Prakrit and Pali—Modern Sanskrit—Vedic Sanskrit		Indic	Southern Division	Aryan Family.
Persia, Afghanistan, Kurdistan, Bokhara,	Parsi—Pahlavi—Cuneiform Inscriptions—Zend.		Iranic		
Armenia,	Old Armenian				
Ossethi,					
Wales, Brittany,		Cymric	Celtic	Northern Division	
+ Scotland, Ireland, Man,	Cornish	Gadhelic			
Portugal, Spain, Provence, France, Italy,	Langue d'oc / Langue d'oil — Lingua vulgaris — Osean, Latin, Umbrian		Italic		
Walachia, The Grisons, Albania,			Illyric		
Greece,	Κοινή — Doric—Æolic; Attic—Ionic		Hellenic		
Lithuania, + Courland & Livonia (Lettish),	Old Prussian	Lettic	Windic		
Bulgaria, Russia (Great, Little, White Russian), Illyria (Slovenian, Croatian, Servian),	Ecclesiastical Slavonic	Southeast Slavonic			
Poland, Bohemian (Slovakian),	Old Bohemian	West-Slavonic			
Lusatia,	Polabian				
Germany,	Middle High-German; Old High-German	High-German	Teutonic		
+ England, Holland, Friesland, North of Germany (Platt-Deutsch),	Gothic; Anglo-Saxon; Old Dutch; Old Frisian; Old Saxon	Low-German			
Denmark, Sweden, Norway, Iceland,	Old Norse	Scandinavian			

No. II.—Genealogical Table of the Semitic Family of Languages.

Living Languages.	Dead Languages.	Classes.	
Dialects of Arabic, Amharic,		Arabic or Southern	Semitic Family.
+	Ethiopic; Himyaritic Inscriptions		
The Jews,	Biblical Hebrew	Hebraic or Middle	
+	Samaritan Pentateuch (3d c. A.D.)		
+	Carthaginian, Phœnician Inscriptions		
+	Chaldee (Massorah, Talmud, Targum, Biblical Chaldee)	Aramaic or Northern	
Neo-Syriac,	Syriac (Peshito, 2d c. A.D.)		
+	Cuneiform Inse. Babylon, Nineveh		

PHILOMATH, n. *fĭl′ō-măth* [Gr. *philos*, loved; *man′-hănō*, I learn]: a lover of learning. PHILOMATH′IC, a. *-măth′ĭk*, pertaining to the love of learning.

PHILOMEL, n. *fĭl′ō-mĕl*, or PHILOME′LA, n. *-mē′lă* [Gr. *Philomēla*, mythical daughter of King Pandion of Attica, who was changed into a nightingale, or, as some say, a swallow]: the nightingale. Modern poets are (or rather were, for it was chiefly an 18th-c. fashion) fond of calling the nightingale by this classic name.

PHILOPENA, *fĭl-ō-pē′nâ* [origin uncertain and orthography unsettled]: simple game or play of forfeit. A person in a party finding a two-kerneled almond, or other nut, presents one of the kernels to another person, keeping the other himself. Whichever one of the two persons either receives from the other's hand any object offered, or answers by yes or no a question put by the other, or at the next meeting of the two is not the first to say 'philopena,' or fails on any other test that has been agreed upon, must pay forfeit to the other. The word P. is used to denote also the salutation, also the kernel of the nut whose transfer is the first act in the play. As remarked above, the word P. is written in many ways—filopena, filipeen, phillipene, etc. One derivation of the word is from the proper names Philip, Philippine, supposed to be names given to each other by the two parties in the play, male and female. At least as probable is the derivation from Ger. *vielliebchen*, sweetheart, darling. An argument in favor of this derivation is, that the play appears to be of Ger. origin. The derivation of the word from the Greek, *phile poinē* (friendly penalty), is untenable.

PHILOPŒMEN, *fĭl-ō-pē′mĕn:* the most illustrious patriot and general in the later history of Greece: about B.C. 252—about B.C. 183; b. Megalopolis, in Arcadia; of one of the best families of Arcadia. At an early age he lost his father, and was brought up by a wealthy citizen, Cleander, who gave him an excellent education. His earliest experiences of war were in the border raids of the Arcadians into Laconia; but B.C. 222 he was one of the defenders of Megalopolis against Cleomenes, King of Sparta. Next year, when the Macedonian king Antigonus marched to assist the Achæans, P. joined him at the head of 1,000 horse, and contributed materially to the terrible defeat which the Spartan king received at Sellasia. As tranquillity was for a short time restored to Greece, P. went abroad to perfect himself in the art of war, and served in Crete with such distinction, that on his return to the Peloponnesus, B.C. 210, he was appointed gen. of the Achæan horse. In the expedition against Elis (209) he slew the Elean leader, Demophantus, with his own hand. In 208 he was raised to the highest military dignity then possible in Greece, being elected *strategus* or commander-in-chief of the Achæan League, and in this capacity signalized himself by great improvements in the drill, discipline, and armor of the Achæan

soldiery. The ancient heroism of the land seemed to be reviving. The battle of Mantineia, in the same year, and in which the Spartans were again utterly routed—their gen. and king, Machanidas, falling by the sword of P. himself—raised P. to the pinnacle of fame; and at the Nemean festival which followed, he was proclaimed liberator of Greece. His exalted honors did not in the least disturb the integrity of his character. So great was his influence over his quarrelsome countrymen, that the Macedonian monarch, Philip, began to fear that Greece would regain its independence, and tried to have him secretly assassinated; but the infamous treachery was discovered in time, and its only effect was to endear P. still more to the Achæans. Another of his determined enemies was Nabis, successor of Machanidas in the 'tyranny' of Sparta; but B.C. 201 P. inflicted on him a severe defeat at Skotetas, on the borders of Laconia. During the next few years he was absent in Crete, partly, it seems, for political reasons; but returned to the Peloponnesus B.C. 194 to find matters in a serious condition. A new and dreaded power—the Romans—had appeared, and overthrown both Philip and Nabis; and P. foreboded future mischief to all Greece from these ambitious warriors. On the departure of the consul Flamininus, Nabis recommenced hostilities against the Achæans; P. was once again appointed strategus (192); and in a pitched battle nearly annihilated the troops of Nabis, who himself was shortly afterward killed by the Ætolians. P. now exerted all his power to heal the divisions among the Achæans, and to prevent them from affording the Romans a pretext for taking away their independence. In 188 he took a fierce revenge on Sparta for having put a number of his friends to death, and was in consequence strongly censured by the Roman senate, and by Q. Cæcilius Metellus, who was sent out as a commissioner to Greece B.C. 185. Two years later, P. (now an old man of 70) was elected strategus for the eighth time. When lying ill of a fever at Argos, news was brought to him that the Messenians had broken their connection with the league; P. instantly rose from his sick-bed, hastened at the head of some cavalry to quell the revolt, but was overpowered by numbers, and fell into the hands of Deinocrates, leader of the Messenians, who two nights afterward sent him a cup of poison, which P. drank and died. The remains of the hero were brought in solemn procession to his native city—the historian Polybius carrying the urn—and statues were erected to his memory by his grateful and repentant countrymen.

PHILOPROGENITIVENESS, n. *fĭl'ō-prō-jĕn'ĭ-tĭv-nĕs* [Gr. *philos*, loved; L. *progenĭēs*, offspring]: in *phren.*, faculty common to man and the lower animals, whose chief function concerns the instinctive love of young—its organ in the brain is said to lie immediately above the middle part of the cerebellum.

PHILOSOPH'ICAL ANAT'OMY: comparative anatomy in the widest sense; called also Transcendental Anatomy. Philosophical Anatomy seeks to reduce under one plan the multitudinous diversities seen in organized bodies, whether animal or vegetable; to discover the principles that govern growth and development; and to point out functional analogies and structural homologies throughout the entire series of organized bodies, i.e., of bodies that either are or have been living.

PHILOSOPHY, n. *fĭl-ŏs'ō-fĭ* [Gr. *philos*, lover; *sophia*, wisdom—from *sophos*, wise]: systematic investigation of the causes of all phenomena both of mind and of matter, or of the phenomena in any one department; the knowledge of things natural and moral, gained by reasoning, experience, and observation: reasoning: Until recently it has been the custom in English writing to use the term 'natural philosophy' to apply to the study of the natural sciences like physics and biology. The term 'mental' or 'moral philosophy' was then used to distinguish from the former the studies of mind and morals. The general term 'philosophy' was vaguely used to apply to either or both of these main branches. At present the term philosophy is increasingly confined to the study of metaphysics and its immediately allied branches. Philosophy practically includes, when the term is thus employed, the several disciplines, ethics, logic, æsthetics, psychology and metaphysics, including epistemology. The term philosophy is not infrequently used nowadays when metaphysics and epistemology are exclusively or chiefly in mind. The separation from psychology is more complete than in the case of any of the other branches of philosophy above mentioned. Psychology has become a recognized and independent science, but it arose from philosophy as have all the other sciences. As the latest to achieve independence it has not been so completely separated either in the popular mind or the procedure of philosophic thinkers as have the remaining sciences. PHILOS'OPHER, n. *-ō-fẽr*, one profoundly versed in philosophic science; one who acts calmly and wisely. PHIL'OSOPHIC, a. *fĭl'ō-sŏf'ĭk*, or PHIL'OSOPH'ICAL, a. *-ĭ-kăl*, according to, skilled in, or given to, philosophy; regulated by the rules of reason and experience; calm; rational. PHIL'OSOPH'ICALLY, ad. *-lĭ*. PHILOSOPHIZE, v. *fĭl-ŏs'ō-fīz*, to investigate or reason like a philosopher; to moralize; to search into nature. PHILOS'OPHIZING, imp.: ADJ. reasoning or investigating like a philosopher: N. consideration or investigation after the manner of a philosopher. PHILOS'OPHIZED, pp. *-fīzd*. PHILOS'OPHIZER, n. *-zẽr*, one who philosophizes. PHILOSOPHER'S STONE, an imaginary substance said to be able to transmute or change the inferior metals into gold. PHILOS'OPHISM, n. *-fĭzm*, unfounded or shallow philosophy; sophistry. PHILOS'OPHIST, n. *-fĭst*, one who practices sophistry. PHILOS'OPHIS'TIC, a. *-fĭs'tĭk*, pertaining to the love or practice of sophistry.

PHILOS'OPHY: term whose meaning has grown beyond its original significance, which was 'love of knowledge,' and which implied a special taste, appetite, or desire, whose subject-matter was knowledge. At first, man's pursuit of knowledge was subservient to the immediate uses of life; but, in the course of time, an interest was taken in knowing the order of the world, independent of its application to the common utilities. We find that this stage had been reached in Greece, especially, about five or six centuries before Christ; at which time the name 'philosophy' took its rise, being attributed to Pythagoras.

The word P. has had a variety of acceptations, though all pervaded by the one idea of employing the human understanding in the search for increasing knowledge and certainty. It always implies this effort in a distinguished degree, such as only a few persons in any age have ever been able to sustain. The pursuit of knowledge had to become an end in itself; for the mere improvement of practice would not at first have been a sufficient motive for men to undergo the labors of scientific inquiry. Indeed, this improvement was not at all apparent as a consequence of the earliest efforts of speculation. As one celebrated example, the investigation of the properties of the sections of the cone—the ellipse, parabola, and hyperbola—was without any practical use for nearly 2,000 years.

As may be readily supposed, the precise aim of P., that which constitutes its end, has varied with the advancement of its study. In modern times, the pursuit of truth has taken a well-defined form, expressed by the name Science (q.v.). But, in the ancient world, this operation was a mixture of speculation, practice, and sentiment—of legitimate inquiry with aspirations after the unattainable; hence the word P., in its modern use, often refers to the subjects that have not as yet adopted the strict scientific form. On this view, science is the goal and the grave of philosophy. (See Lewes's *Biographical History of Philosophy*.) It is chiefly with reference to morals, metaphysics, and the human mind generally, that the term is still retained.

The characters that distinguish the highest form of truth are Generality and Certainty or Precision; and in proportion as a subject has advanced in these respects it might be said to have become philosophical, but the word scientific is now preferred. The theoretical foundations of a practical subject, e.g., grammar, are sometimes pretentiously called the P. of it. So any department of nature or humanity, where explanations by general laws are furnished, is styled 'philosophical;' thus we have the P. of zoology or of history, and a 'philosophical' naturalist or historian.

Again, after definite branches of knowledge have taken a scientific shape, and have been reckoned as distinct 'sciences' (mathematics, etc.), the general principles and views that are supposed to run through the whole are

sometimes called P. This was one of the meanings of the word in Plato. The great work of Auguste Comte bases its title (*Cours de Philosophie Positive*) on this consideration.

Prof. Ferrier remarks that P. is not truth, but '*reasoned* truth;' that is, it must be truth presented under the forms and processes that evolve and establish the highest or scientific knowledge. This is merely another mode of stating that P. implies a special procedure for attaining truth, the ordinary unregulated operations of the understanding being insufficient.

Among the oldest problems of P., is to be reckoned the attempt to generalize the universe, or to resolve all nature into some great unity, or common substance or principle—a conception at the root of the very name 'universe.' Thales considered Water the primordial and fundamental principle. Anaximander adopted as the foundation of the universe something called by him the Infinite or Indeterminate, out of which the various definite substances, air, fire, water, etc., were generated, and to which they were again resolved. Anaximenes assumed Air as the primordial substance, which, by rarefaction, produced fire and ether, and, by condensation, water, earth, and stone. These three philosophers belonged to the Ionic colony of Miletus. Pythagoras was an emigrant from Ionia to Italy: he gave Number as the essence and foundation of all existing things: the different numbers being representative of different natural properties and powers; thus, *fire* stood for color, *six* for life, etc. Xenophanes of Kolophon attacked the popular polytheism, and propounded one great indivisible agency comprehending and identified with the universe, which he would not designate as finite or infinite, in motion or at rest. Parmenides of Elea distinguished between self-existent being, Ens, or the absolute, characterized by extension and duration, and phenomenal nature, the region of inferior certainty, or mere opinion. This was the first sketch of what has since been called Ontology, or the science of the *noumenon*, or absolute being. Heraclitus of Ephesus maintained an absolute of a totally different character—a principle of incessant Change, the negation of all substance and stability, a power of perpetual destruction and renovation. Empedocles took his stand upon the Four Elements, out of which all things were constituted by the action of the opposing principles of love and enmity or discord—a poetical representation of attraction and repulsion. Anaxagoras also treated the world as made up of elements, but indefinite in number. By the attraction of each for its own kind, the primitive chaos was separated; but excepting 'mind,' no element ever was perfectly pure, the character of each substance being determined by the predominance of the proper element. These elements were called the 'homœomeries.' Diogenes of Apollonia, last of the series of Ionic philosophers, adopted in a modified form the tenet of Anaximenes, that Air

was the primordial element. The celebrated Atomic theory originated with Leucippus, though usually ascribed to his pupil Democritus of Abdera. The elements of Anaxagoras were acted on by mind, but with Democritus their activity was inherent in themselves from the beginning.

The grand problem of External Perception (see PERCEPTION) was agitated at an early period, and has been always reckoned a leading question of philosophy. The first attempt at a solution was an application by Democritus of his atomic hypothesis. He supposed that all things were constantly throwing off images of themselves, which enter the soul through the pores of the organs of sense. He was aware that this left us in a state of uncertainty, as to whether the images corresponded to the otherwise unknown originals.

The many difficulties and uncertainties incident to the search for knowledge could not but be felt by inquirers generally. There was one sect especially impressed by this consideration, hence called Skeptics or Doubters. They were represented in antiquity by Pyrrho. They dwelt on the absence of any sure criterion of truth, and pointed out that what was considered most certain was not free from objections or counter-arguments.

Philosophical speculation began to take definite shape in the age of Plato and Aristotle, the age of the beginnings of many of the sciences. Especially at this time do we find the distinct enunciation of the Philosophy of Human Life, otherwise called Moral and Ethical Philosophy. The questions concerning the end of life, the pursuit of happiness, and men's duties in various relationships, had been answered by a sort of rule-of-thumb experience, rather than by deep reflection or far-seeing combinations. The distinctions of virtue and vice were determined by political society, and connected more or less with religion. There were tests and maxims of conduct, most of which were merely prudential. The first approach to a moralizing strain is found in the poems of Hesiod. He combines a gloomy view of life with much practical wisdom, enjoining justice, energy, temperance, and simplicity of living. The 'Seven Wise Men,' B.C. 6th c., followed in the same course, uttering a variety of sayings or short maxims, whose ordinary subjects were 'the uncertainty of human things, the brevity of life, the unhappiness of the poor, the blessing of friendship, the sanctity of an oath, the force of necessity,' etc., together with the simple rules of prudence. The most celebrated saying of this age was the Delphian inscription (of uncertain authorship), 'Know thyself.' The teaching of the Sophists made another stage in the history of moral philosophy. They opened discussions on virtue, on justice, on the laws, and on happiness; and framed hortatory addresses with a view to moral culture. Socrates then came forward, and instituted a severe logical analysis of the meaning of ethical terms, asking 'What is piety? What is impiety? What is the noble?

What the base? What is just? What is temperance? What is madness? What is a state? What constitutes the character of a citizen? What is rule over man? What makes one able to rule?' The rigid search after strict definitions of these terms may be said to constitute a philosophical method in ethics; hence Socrates is called the first moral philosopher. He gave the impulse to Plato, his successor, who in his turn acted on Aristotle; he gave impulse also to the opposing sects of the Cynics and the Cyrenaics—the one affecting a hard and ascetic life and a proud superiority of the individual will to all outward conventions and customs; the other avowing pleasure as the chief good, holding loosely to the irksome duties of the citizen, and, in despair of attaining happiness, sliding into apathy. The Stoics and the Epicureans afforded a contrast similar though differently expressed. The Stoic ideal was a being in whom the natural impulses and desires should be absolutely subjected to highly abstract views of the universe: the Epicurean ideal was a being moving harmoniously according to natural impulses—in short, following nature to the limits of prudence.

The last phase of ancient philosophy is represented by Neo-Platonism (q.v.), or the Alexandrian school (see ALEXANDRINE AGE). In the middle ages, speculative philosophy took the form called Scholasticism (q.v.). At the revival of learning, Descartes and Bacon led in opposite directions, the one representing what is called *a priori* philosophizing; the other, *Induction* (q.v.). Since that time philosophy has come to mean more exclusively the inquiries connected with the mind, as exemplified in the writings of Hobbes, Locke, Leibnitz, Berkeley, Hume, Reid, Kant, etc. The qualified phrase Natural Philosophy (in the English sense) was applied to a special department of the outer world, now usually designated Physics, as Moral Philosophy was used in connection with mind and the discussion of moral duties.

PHILOSOPHY, HISTORY OF. While the philosophy of the Orient, especially that of India, is by no means insignificant, the term 'history of philosophy' is usually understood to designate the development of philosophy in Europe and America. Of this, three periods are recognized: (1) Ancient (from about 600 B.C. to 529 A.D.); (2) Mediæval (about 500 A.D. to 1500 A.D.) with which, on account of its generally similar nature, is usually included Patristic philosophy (the ancient fathers of the church); (3) Modern (since 1500 A.D.).

Ancient philosophy is subdivided into: (1) Cosmological period (600 B.C.—450 B.C.) chiefly concerned with the origin and nature of the heavens and earth, the principal schools being the early Ionian, Eleatic, Pythagorean, and the Atomists (qq.v.); (2) Systematic (450 B.C.—322 B.C.) which centers about the nature

1. Aristotle.
2. Plato.
3. René Descartes.
4. Immanuel Kant.
5. John Stuart Mill.
6. Arthur Schopennauer.
7. Herbert Spencer.
8. Gottfried Wilhelm Leibnitz.

of human knowledge and human institutions and ideals, the chief philosophers being Socrates, Plato, and Aristotle (qq.v.); (3) Ethical (q.v.) (332 B.C.—529 A.D.) in which ethical questions superseded all others, and the chief question—what should be the life of the wise man—was variously answered by Stoics, Epicureans, Skeptics, and Neo-Platonists (qq.v.).

Patristic and Mediæval Philosophers regarded philosophy as merely an instrument to organize and explain the doctrines of the church. The greatest philosophers of these periods were Origen, Athanasius, Augustine, Anselm, and Thomas Aquinas (qq.v.).

Modern philosophy (1) began with the Renaissance (q.v.) (15th and 16th centuries) in which it broke away from scholastic theology, revived the study of the ancient philosophers, and again took up the study of nature and man, its chief philosophers being Bruno, Campanella and Paracelsus. (2) The second period finds philosophers divided into the opposing camps of Rationalism (q.v.) (Descartes, Spinoza, Leibnitz, Wolff, Voltaire qq.v.), and Empiricism (q.v.) (Bacon, Locke, Berkeley, Hume, Condillac qq.v). (3) This opposition is criticised and overcome in Kant's *Critique of Pure Reason*, (1781), and a new epoch begins. Kant (q.v.) and his successors down to about 1860 employed for the most part logical and metaphysical methods; since then, the theory of evolution has led to a larger use of methods drawn from biology and the natural sciences. Among the chief names of this period may be mentioned Fichte, Schelling, Hegel, Schopenhauer, Lotze, Nietzsche, Maine de Biran, Cousin, Comte, the Mills, Hamilton, Herbert Spencer, T. H. Green (qq.v).

To Hegel, Victor Cousin, and Kuno Fischer among others, belongs the chief credit for introducing intelligent and scientific methods into the treatment of the history of philosophy. The following three considerations are now always carefully employed in interpreting any work in philosophy, and opinions differ only as to their relative importance: (1) the personal history and character of the author; (2) the general spirit, social life, interests, and culture of the period, and their influence upon the author; (3) the position of the treatise with reference to the logical development of thought upon the problems discussed.

PHILOS'OPHY, Moral. See Ethics.

PHILOSTRATUS, *fĭ-lŏs'tra-tŭs*, the Elder, of Lemnos: famous Greek sophist and rhetorician: b. probably in Lemnos, between A.D. 170 and 180. He studied under Proclus at Athens, and finally established himself at Rome, where he became a member of the brilliant and learned circle that gathered round the 'philosophic' Julia Domna, wife of Emperor Severus. He was alive, according to Suidas, in the time of Emperor Philip (244–249). He is author of a number of works still extant, and not

without value for their matter, though the style and arrangement are faulty. Among them are a life of Apollonius (q.v.) of Tyana, a description of a collection of paintings at Naples under the title *Imagines*, biographies of a number of sophists, *Heroica*, Letters, etc. There are complete editions of his works by Morel (Paris 1608); Olearius (Leip. 1709); and Kayser (Zur. 1844 *et seq.*), the last by far the most correct and critical.—PHILOSTRATUS the Younger, called Philostratus the Lemnian, also a teacher of rhetoric and oratory, was an intimate friend, perhaps a relative, of the former; but nothing is known with certainty regarding him.

PHILOXENUS, *fī-lŏk'sĕ-nŭs*: Greek dithyrambic poet: b. 435 B.C.; d. 380 B.C. He was originally from Cythera, and upon the capture of the island was taken as a prisoner of war to Athens, where he became the slave of Melanippides, the musician, who educated and freed him. For a considerable time he lived at the court of Dionysius I. of Syracuse. He severely wounded the vanity of the tyrant by refusing to praise the latter's verses, declaring, on being given one to revise, that the best revision would be to draw a black line through the entire production. As a result he was put in prison; he either escaped thence or soon after his release left the court. He wrote 24 dithyrambs, including the *Cyclops*, his most celebrated work, and the *Deipnon* (*Banquet*), of each of which fragments remain. He was long highly esteemed; and so late as the time of Polybius his dithyrambs were annually presented by the Arcadians.

PHILTER, n. or PHILTRE, n. *fĭl'tẽr* [F. *philtre;* L. *philtrum*, a love charm or potion—from Gr. *philtron:* It. *filtro*] potion intended or adapted to excite love: V. to give a love-potion to; to charm or excite to love. PHIL'TERING, imp. PHIL'TERED, pp. *-tẽrd.*—The *Philter* represents an ancient superstition. A belief in the efficacy of certain artificial means of inspiring and securing love seems to have been prevalent from very early times; and among the Greeks, and among the Romans in the later days of the republic and under the emperors, love-charms, especially love-potions, were in continual use. It is not certainly known of what these love-potions were composed—nor can we rely entirely on the details given on this subject by classic writers, and their commentators in later time—but there is no doubt that certain poisonous or deleterious herbs and drugs were among their chief ingredients, to which other substances, animal as well as vegetable, are said to have been added, coupled with the employment of magic rites. Thessaly had the credit of producing the most potent herbs, and her people were notorious as the most skilful practicers of magic arts, whence the well-known 'Thessala philtra' of Juvenal (vi. 610). These potions were violent and dangerous in operation, and their use resulted often in

the weakening of the mental powers, madness, and death, instead of the purpose for which they were intended. Lucretius is said to have been driven mad by a love-potion, and to have died by his own hand in consequence —though the story scarcely rests on sufficient authority; and the madness of Emperor Caligula was attributed by some persons to love-potions given him by his wife Cæsonia—by which also she is said to have preserved his attachment till the end of his life. In the corrupt and licentious days of the Roman empire, the manufacture of love-charms of all kinds seems to have been carried on as a regular trade; the purchasers, if not the makers of them, being chiefly women. The use of philters seems to have been known during the middle ages; and in the East, the abode of superstition of all kinds, belief in the power of love-potions lingers probably at the present day.

PHIMOSIS, n. *fī-mō'sĭs* [Gr. *phimōsis,* binding or constriction; *phimŏō,* I muzzle or silence—from *phīmos,* a muzzle]: the constriction of the extremity of the prepuce, in which it cannot be drawn back.

PHIPS, or PHIPPS, *fĭps,* Sir WILLIAM: 1651, Feb. 2—1695, Feb. 18; b. Pemmaquid (now Bristol), Me.; d. London, Eng.: adventurer, and governor of the colony of Massachusetts. Having learned the trade of ship-carpenter in Boston, he built himself a vessel for commercial purposes and for use in seeking for treasures of wrecked vessels. His one great success was the recovery of plate worth $1,500,000 from the wreck of a Spanish vessel near the Bahamas. He commanded an expedition against Port Royal 1690, capturing the place; 1691 he commanded 34 vessels in the invasion of Canada by the colonists. After besieging Quebec for several days, the colonial land and naval forces had to abandon the enterprise. While visiting England to enlist the assistance of the govt. in another expedition against Canada, Phips was appointed capt.-gen. and governor of Massachusetts 1692. He arrived in Boston May 14; and one of his first acts was to appoint a commission of 7 magistrates to take cognizance of cases of witchcraft; he thus put a stop to prosecutions on that charge. He returned to England 1694 to answer complaints that had been brought against him; he was assured that it was the purpose of the govt. to restore him, but while waiting he died of a malignant fever.

PHIPPS INSTITUTE, THE HENRY: an institution in Philadelphia, Pa., founded by the generosity of Henry Phipps of Pittsburg, Pa., for 'the study, treatment, and prevention of tuberculosis.' The institution was opened 1903, Feb. 1, and incorporated under the laws of the State of Pennsylvania, 1903, Sept. 1. The medical director is Lawrence F. Flick. The first year there were in the house 52 beds, which were occupied all the time, and 2,000 patients were treated in the dispensary. Inspectors visited the homes of the outside patients to see

that instructions were carried out. In 1903 the Institute gave a series of International Lectures which were largely attended. Great opportunities are furnished by the Institute for research into the nature and best treatment of tuberculosis, a disease attended with the greatest mortality of any disease known in civilized countries.

PHIZ, n. *fĭz* [a contr. of *physiognomy*]: the face or visage, a term used in sport or contempt.

PHLEBECTASIS, n. *flĕ-bĕk'tă-sĭs*, or PHLEBECTASIA, n. *flĕb'ĕk-tā'zhĭ-ă* [Gr. *phleps*, a vein, *phlĕbos*, of a vein; *ektăsis*, extension—from *ekteinō*, I stretch out]: dilatation or varicosity of a vein, or of part of a vein.

PHLEBENTERISM, *flĕ-bĕn'tĕr-ĭzm:* term invented by De Quatrefages to designate an anatomical arrangement, existing, as he supposed, in certain of the nudibranchiate mollusks, and characterized by ramified prolongations of the digestive tube, in virtue of which the digestive apparatus, to a certain extent, supplies the place of a complete circulatory apparatus, and aids in the process of respiration. The researches of Alder and Hancock, and other zoologists, however, seem to show that in these animals the circulation is as complete as in the gasteropodous mollusks generally, and that these ramified prolongations are of the nature of a rudimentary liver. See De Quatrefages's *Rambles of a Naturalist*, I.

PHLEBITIS, n. *flĕ-bī'tĭs* [Gr. *phleps* or *phleba*, a vein in animals]: inflammation of a vein. Phlebitis, though seldom an original or *idiopathic* disease, is a frequent sequence of wounds, in which case it is termed *traumatic* phlebitis [from the Greek *trauma*, a wound], and is not uncommon after delivery. The disease is indicated by great tenderness and pain along the course of the affected vessel, which feels like a hard knotted cord, and rolls under the fingers. The hardness is, however, sometimes obscured by the swelling of the limb beyond and about the seat of the disorder, partly in consequence of the effusion of serum caused by the obstruction to the return of the venous blood (which thus gives rise to a local edema) and partly in consequence of the propagation of the inflammation to the surrounding tissues. If the vessel is small, the consequences of its obstruction may be of little importance; but when a large vein is affected, the consequences are always dangerous, and may be fatal. There are two modes of recovery: solution of the coagulated fibrin may take place, and the vessel may again become pervious; or, as is more frequent, the obstruction may continue, but a collateral venous circulation may be established, and the circulation thus carried on through a circuitous route. With the return of the circulation—in whichever of these two ways it is accomplished—the swelling subsides, and the patient gradually recovers. If, however, the disease advances, suppuration takes place within the coagulum, and one of two things happens: either abscesses are formed

along the vein, or the pus passes into the current of blood and contaminates the circulation, giving rise to blood-poisoning, or *Pyaemia* (q.v.). Even if suppuration does not occur, a portion of the clot within the vein may become detached and be carried to the heart or other parts of the circulation, causing embolism. In the treatment of phlebitis absolute rest of the limb is necessary in order to prevent, if possible, the detachment of portions of the clot with the consequent formation of emboli in some other part of the circulation. The limb should be elevated and firmly supported, and if pain is severe cold applications may be made. In some cases, when the vein is superficial a cure may be obtained by cutting out the diseased portion.

PHLEBOGRAPHY, n. *flĕ-bŏg'ra-fĭ* [prefix *phlebo-;* Gr. *graphō,* I write]: a description of the veins.

PHLEBOIDAL, a. *flĕ-boy'dăl* [Gr. *phleps* or *phleba,* a vein; *eidos,* resemblance]: in *bot.*, applied to moniliform vessels; having the appearance of veins.

PHLEBOLITE, *flĕb'ō-līt,* or PHLEBOLITH, *flĕb'ō-lĭth* [Gr. *phleps* or *phleba,* a vein; *lithos,* a stone]: calcareous concretion, often termed *vein-stone,* formed in concentric laminæ by the degeneration of coagulations in veins, or occasionally originating in the coats of the vessels. They are seldom detected till after death, though cases are on record in which, occurring in sub-cutaneous veins, they have given rise to external tumors of considerable size.

PHLEBOLOGY, n. *flĕ-bŏl'o-jĭ* [prefix *phlebo-;* Gr. *logos,* a word, a discourse]: that branch of anatomy which treats of the veins; treatise or discourse on the veins.

PHLEBORRHAGE, n. *flĕb'ėr-ĭj* [prefix *phlebo-;* Gr. *rhagē,* a rupture]: rupture of a vein; venous hemorrhage.

PHLEBOTOMIZE, v. *flĕ-bŏt'ō-mĭz* [Gr. *phleba,* a vein; *tomē,* a cutting]: to let blood from a vein. PHLEBOT'OMIZING, imp. PHLEBOT'OMIZED, pp. *-mīzd.* PHLEBOT'OMIST, n. *-mĭst,* one who practices blood-letting. PHLEBOT'OMY, n. *-mĭ* [F. *phlébotomie,* blood-letting—from Gr. *phlebotŏm'ĭa,* cutting of a vein, blood-letting]: the operation of opening a vein to take blood from the body. See BLEEDING; VENESECTION.

PHLEGETHON, *flĕj'ē-thŏn* (i.e. the Flaming): in classic mythology, a river of the infernal regions, whose waves rolled torrents of fire. Nothing would grow on its scorched and desolate shores. After a course contrary to the Cocytus (q.v.), it discharged itself, like the latter stream, into the Lake of Acheron.

PHLEGM, n. *flĕm* [Gr. *phleg'ma,* inflammation, phlegm —from *phlegō,* I burn: F. *flegme*]: the thick viscid matter discharged by coughing; mucus; humor or temperament; coldness; sluggishness. PHLEGMATIC, a. *flĕg-măt'ĭk,* or PHLEGMAT'ICAL, a. *-ĭ-kăl,* abounding in phlegm; generat-

ing phlegm; dull; sluggish: heavy; not easily excited in action or passion. PHLEGMAT'ICALLY, ad. *-lĭ.* PHLEGMA'SIA, n. *-zhĭ-ă,* plu. PHLEGMA'SIÆ, *-zhĭ-ē,* any inflammatory disease with fever. PHLEGMASOID, a. *flĕg-mā'sĭ-oyd,* or PHLEG'MATOID, a. *-măt-oyd* [Gr. *eidos,* appearance]: having the appearance of an inflammatory disease. PHLEGMON, n. *flĕg'mŏn,* inflammation; inflamed or inflammatory tumor; boil or carbuncle. PHLEG'MONOUS, a. *-ŭs,* inflammatory; burning. *Note.*—The use of the word arose from the supposed influence of the four humors—viz., 'blood, choler, melancholy or gall, and phlegm,' the last being said to cause a dull and sluggish temperament; the ancient sense of 'a cold viscous humor' is hence contrary to the etymology.

PHLEGMASIA DOLENS, *flĕg-mā'sĭ-â dō'lĕnz,* or PHLEGMASIA ALBA DOLENS, or MILK-LEG: disease most frequent in women after parturition, especially if they have lost much blood, but occurring sometimes in unmarried women, and occasionally in men. Its usual beginning is a week or ten days after delivery, with a feeling of pain in the loins or lower part of the abdomen; whence it extends to the groin and down the thigh and leg. The pain soon becomes very severe, and follows principally the course of the internal cutaneous and crural nerve of the thigh and of the posterior tibial in the leg. The limb soon begins to swell, and in two days is sometimes twice its ordinary size; and as the swelling develops, the acuteness of the pain considerably diminishes. The limb is partly flexed, and lies motionless; any movement aggravates the pain. The swelling extends uniformly over the limb, which is pale and shining, and hot and firm to the touch, seldom pitting on pressure. The femoral vein may usually be felt like a hard cord, and this symptom, taken with the swelling, indicates that this affection is essentially *crural phlebitis.* The uniformity of the cord is interrupted by nodules, arising either from inflamed cellular tissue, or from clots within the vein. Both legs are seldom attacked at the same time, and the left thigh is the most common seat of the disease.

This affection usually terminates favorably, the acute symptoms disappearing in ten days or a fortnight. The swelling, however, often continues for a long time, sometimes through life. The treatment is the same as for Phlebitis (q.v.).

PHLEME, n. *flēm:* another spelling of FLEAM, which see.

PHLE'UM. See HERD'S GRASS; TIMOTHY GRASS.

PHLŒUM, n. *flē'ŭm,* or PHLOEM, n. *flō'ĕm* [Gr. *phloios,* the bark of a tree—from *phleō,* I teem with abundance]: in *bot.,* the bast portion of a fibro-vascular bundle, consisting at first of succulent thin-walled cells: it is termed also epiphlœum and bast. The term is now scarcely used by authorities.

PHLOGISTON, n. *flō-jĭs'tŏn* [Gr. *phlogistos*, burnt, set on fire—from *phlogizō*, I burn, I set on fire—from *phlox*, *phlogos*, a flame, a blaze; *phlegō*, I burn]: in *chem.*, a substance supposed by the earlier chemists to exist in all matters that would burn. PHLOGISTIAN, n. *flō-jĭs'tĭ-an*, a believer in or supporter of the existence of phlogiston. PHLOGIST'IC, a. *-jĭst'ĭk*, pertaining, belonging, or relating to phlogiston; in *med.*, of or belonging to inflammations and fevers with a hard pulse and topical pain. PHLOGIS'TICATE, v. *-jĭs'tĭ-kāt*, to combine phlogiston with. PHLOGIS'TICATED, pp. or a., not combined with phlogiston.

PHLOGISTON, *flō-jĭs'tŏn* [Gr. *phlogistos*, inflammable —from *phlox*, flame]: in chemistry, a hypothetical substance supposed at one time to be a part of all bodies that were capable of being burned. The conceptions of the terms element and combustion have been many and varied, but the first of real importance to the phlogiston theory was that of Becker (1635–82). He held that all inorganic substances were composed of three 'earths,' the mercurial, the vitreous and the combustible called 'terra pinguis,' and that when substances were burned or metals calcined (oxidized) this latter 'earth' escaped. Stahl (1660–1734) expanded this idea into what was known as the Phlogiston Theory. This holds that all substances capable of burning, and calcination was recognized as slow combustion, contained a substance called phlogiston and that this was given off when the substance burned. A substance that had been burned could be rephlogisticated, and thereby made capable of being burned again by being heated with a substance rich in phlogiston. This theory was accepted until toward the end of the 18th century. Phlogiston itself was never isolated, though the hydrogen discovered by Cavendish was thought by some to be this all important substance. Facts began to accumulate, however, that seemed opposed to this theory. It was shown that metals gained instead of lost weight when calcined. Phlogisticians at first denied this, but later tried to explain it by claiming that phlogiston possessed negative weight, and that therefore a substance would, of course, be heavier when it had been driven off. Substances would not burn except in the presence of air. This was said to be because the air must be present to take up the phlogiston. The final overthrow of the theory was accomplished by Lavoisier. He showed and proved by careful weighings that a metal when calcined gained in weight and exactly as much as was taken from the air. Later, after the discovery of oxygen and its presence in the air by Leheele and Priestley, he showed that it was this oxygen that combined with a burning substance. Combustion was thus shown to be combination with oxygen rather than loss of phlogiston and the phlogiston theory was abandoned. See COMBUSTION; LAVOISIER; PRIESTLEY; STAHL.

PHLOX, n. *flŏks*, PHLOXES, n. plu. *flŏks′ēz* [Gr. *phlox*, flame—from *phlegō*, I burn]: favorite genus of garden flowering plants, having red, white, or purple flowers, of which many fine varieties have been produced under cultivation. The genus is of the nat. order *Polemoniaceæ*, distinguished by a prismatic calyx, salver-shaped corolla, and unequal filaments. The species are numerous, mostly perennial plants with simple leaves. The tall decussate forms originated probably from *P. paniculata*. Other forms, the annuals, have come from *P. Drummondi* of the South. The Moss PINK (*P. subulata*), is a beautiful adornment of rocky hills, occurs both pink and white, and is used for rockeries. *P. maculata* is the SWEET WILLIAM of gardens. *P. pilosa*, with varying colors of purple, red, and white, gives an appearance of great floral richness to prairies. *P. divaricata* and *P. bifida* are delicate blue. There are a number of other species.

PHLYCTÆNA, n. *flĭk-tē′nă* [Gr. *phluktai′na*, a blister, as that caused by pulling at oars—from *phluzō*, I swell over, I bubble up]: a rising on the skin; a vesicle, pimple, or pustule. PHLYCTENOID, a. *flĭk-tē′noyd* [Gr. *eidos*, resemblance]: bearing a resemblance to phlyctæna. PHLYCTENULA, n. *flĭk-tĕn′ū-lă*, a little phlyctæna. PHLYCTEN′ULAR, a. *-ū-ler*, having the character of a phlyctæna.

PHOBEROS, *fō′bē-rŏs:* genus of trees of order *Flacourtiaceæ* or *Bixaceæ*, of which one species, *P. Mundtii*, the *Klipdoorn* of the Dutch colonists of s. Africa, though only 20–30 ft. high, attains a diameter of three ft. or more, and is very useful for the purposes of wagon-makers and house-carpenters, the wood being hard and fine-grained: another s. African species, *P. Ecklonii*, the *Roodpeer* of the colonists, has a hard, heavy, and fine-grained wood, used by cabinet-makers, millwrights, etc.

PHOBOS, n. *fō′bos:* in *class. myth.*, a son of Mars, and the god of fear or terror.

PHOBOS, n. *fō′bos* [Gr. *phobos*, fear]: in *astron.*, one of the two satellites of Mars, discovered by Prof. Asaph Hall of Washington 1877. It revolves round Mars three times while that planet turns once round on its axis—a fact unique in the solar system.

PHOCA, n. *fō′kă* [L. *phōca;* Gr. *phōkē*, a sea-calf]: the seal or sea-calf, an amphibious animal. PHOCACEAN, n. *fō-kā′sĕ-ăn*, an animal belonging to the genus *Phoca;* a seal. PHOCENINE, n. *fō-sē′nĭn*, a peculiar fatty substance found in the oil of the porpoise, which itself yields *phocē′nic acid.* PHOCIDÆ (see SEAL). PHOCINE, a. *fō′sĭn*, pertaining to the seal tribe.

PHOCÆA, *fō-sē'a:* ancient city in the w. portion of Asia Minor, 25 m. n.w. from Smyrna. It was the northern city of Ionia, on a peninsula with a good harbor on either side. Its people were the first Greeks to sail to distant lands, and at an early period they became noted for maritime achievements. They founded several colonies, and were very prosperous till B.C. 546, when the city came under the Persian power, after which it greatly declined. It was taken by the Romans B.C. 191, and maintained an existence for a long period, but only a few ruins now mark its site.

PHOCÆ'NA: see PORPOISE.

PHOCAS, *fō'kas*, Emperor of Constantinople: d. 610 (reigned 602–610); b. in Cappadocia. He was for some time groom to Priscus, one of the celebrated generals of Emperor Mauricius (q.v.). His brutal courage gained him great reputation among the soldiers, and, though only a centurion at the time of the revolt against Mauricius, he was elevated by them to the throne. To secure himself, he caused Mauricius to be murdered, with his five sons and his principal adherents; and then, by a treaty disgraceful to the empire, rid himself of the Avars. But his troubles were just commencing, for Khosrû II. (q.v.), Shah of Persia, hearing of the death of his friend and benefactor, Mauricius, an event which freed him from the obligation of amity with the Eastern Empire, took up arms to revenge his friend's murder, and to recover for Persia all the territories previously under her sway. The war was fiercely carried on for 24 years, during the first 18 of which the Persian army was uniformly successful, and the Byzantines were almost completely driven out of Asia. See KHOSRU II.: HERACLIUS. P. remained in the capital, to overawe his turbulent subjects, conscious of his unfitness to command the army; and abandoned himself to his animal appetites, tyrannizing over the people without the least regard to justice, aud putting to death whomsoever he thought dangerous—among others, Narses, the celebrated general in the former Persian war. Constantina, widow of Mauricius, excited against the tyrant two formidable insurrections, the latter in 607; but both were speedily quelled; and the ex-empress, with her daughters, was beheaded on the same spot where her husband and sons had been slain. Her principal adherents, some of whom were among the highest officers of state, suffered death under horrible tortures. These cruelties, and the successes of the Persians, had nearly ruined P.'s power and influence; but he himself gave the *coup-de-grâce* to it by insulting his favorite and son-in-law, Crispus, who had remonstrated with him on his conduct. Crispus revenged himself by forming with Heraclius, exarch of Africa, a conspiracy against him—the result of which was the overthrow of the tyrant, who was taken prisoner 610, Oct. 3. After being insulted and tortured, he was beheaded, and his body dragged through the streets by the mob.

PHOCION, *fō′shĭ-on* (Gr. *Phokiôn*): Athenian general, of unusual private virtues; b. about the end of B.C. 5th c. (Clinton, in *Fasti Hellenici*, gives the date B.C. 402); d. after B.C. 323. He was of humble origin, but appears to have studied under Plato, Xenocrates, and perhaps Diogenes also, from the last of whom he may have acquired his habit of caustic sarcasm. His keen and biting wit gave him popular force as a speaker, while injuring him as a politic manager of men. P. was the only orator whom Demosthenes feared. Though gruff in manner, he was kind at heart. P. attracted notice first in the great sea-fight at Naxos (B.C. 376), where he commanded a division of the Athenian fleet, and materially helped to secure the victory. Yet we scarcely hear of him again for more than 20 years; but B.C. 351, with Evagoras, he undertook the conquest of Cyprus for the Persian monarch, Artaxerxes III. (Ochus), and was completely successful. About the same time (the exact date is uncertain), he led an Athenian expedition into the island of Eubœa, where Philip of Macedon was intriguing, and inflicted a severe defeat on that powerful sovereign at Tamynæ. B.C. 341, he was again successful in crushing the Macedonian party in Eubœa and restoring the ascendency of Athens. Two years before this, he had achieved a similar result at Megara; and 340, when sent to the aid of the Byzantines against Philip, he acted with so much prudence and tact, and inspired the citizens with so much zeal and courage, that Philip was forced to abandon the siege, and even to evacuate the Chersonesus; while P. captured several of his ships and coast-garrisons, besides making havoc in the Macedonian territory. Nevertheless, with just appreciation of the real weakness of Greece proper, and of the strength of Macedon, he advocated, even in the midst of his triumphs, pacific views, and the establishment of better relations with the enemy. The war party, led by Demosthenes, prevailed, and P.'s advice was not taken; but the fatal battle of Chæroneia, only two years afterward, in which the independence of the Greek republics was lost forever, proved its soundness. The murder of Philip, B.C. 336, occasioned great exultation, and Demosthenes even proposed a public sacrifice of thanksgiving, and the establishment of religious honors to the memory of the assassin; but P. resisted this monstrous proposal. Thenceforth, his career was chiefly political. We see him struggling at Athens to repress the reckless desire for war on the part of the fanatical patriots, on account of which he was regarded as a traitor; but his personal honor is above suspicion. After the death of Alexander, B.C. 323, the aged P. endeavored in vain to hinder the Athenians from going to war with Antipater. The battle of Cranon, next year, which prostrated his countrymen, again evinced the wisdom of his counsels; but, though very unkindly treated by the Athenians, he used all his influence with the conqueror (who, like Alexander, had a profound respect for him) to mitigate their hardships.

After the death of Antipater, P. was involved in the intrigues of Cassander, rival of Polysperchon, and was forced to flee to Phocis, where Polysperchon delivered him up to the Athenians. He was condemned, by 'a mixed mob of disfranchised citizens, foreigners, and slaves,' to drink hemlock. When the poison prepared was found not enough for all, P. was required to pay for more; and with his old disdainful wit remarked that at Athens a man could not even die for nothing. His body, flung unburied over the borders of the state, was carried by some of his friends to Eleusis, and burned there. The fickle Athenians soon began to raise monuments to his memory. His life was written by Plutarch and Cornelius Nepos.

PHOCIS, *fō'sĭs* (Gr. *Phôkis*): province of Greece proper or Hellas, bounded w. by the Ozolian Lokri, n. by Doris, e. by the Opuntian Lokri, s. by the Gulf of Corinth; about 792 sq. m. The greater part of the country is occupied by the famous mountain range of Parnassus (q.v.). The principal river is the Cephissus. According to tradition, the most ancient inhabitants were the Lelegęs, Pelasgians, and Thracians, from the gradual mixture of whom the Phocians were believed to have arisen. These were finally united into a free federal state, historically important chiefly from possessing the famous oracle of Delphi (q.v.). During the Peloponnesian war, the Phocians were close allies of the Athenians. In the time of Philip of Macedon, they were involved in a ten years' war, by their opposition to a decree of the Amphictyonic Council, concerning the use of a piece of land belonging to the temple of Delphi. This war, commonly known as the Sacred or Phocian War, ended disastrously for the Phocians, the whole of whose cities (22 in number) were destroyed, with one exception, and the inhabitants parcelled out among the hamlets.

PHŒBUS, n. *fē'bŭs* [L. *Phœbus;* Gr. *Phoibos* (i.e., the Bright or Radiant), Apollo] :title, subsequently a name, of Apollo. It had reference both to the youthful beauty of the god, and to the radiance of the sun, when, latterly, Apollo became identified with Helios, the sun-god.

PHŒNICIA.

PHŒNICIA, or PHENICIA, *fē-nĭsh'ĭ-a* (Gr. *Phoinike*, either from *phoinos*, purple, or *phoinix*, palm-tree—both descriptive of the chief produce of the country, though there is some probability in the suggestion that *phoinos*, blood-red, referred to the dark complexion of the people; the Hebrew term *Kenaan* [Canaan], Lowland, referring to the physical aspect of the country): name given by the Greeks and Romans to a territory about 34°—36° n. lat., bounded by the Mediterranean on the w., by Syria on the n. and e., and by Judæa on the south. Except where the Mediterranean set a natural boundary, the frontiers differed widely at different periods, n., s., and e., according to the gradual rise and decline of the country. Its length may be said to have been about 200 m., while its breadth never exceeded 20 m., making in general a total of about 2,000 sq. m. The products of the soil, by their exportation, to some extent were the foundation of the wealth and greatness of the Phœnicians—the greatest commercial people of the ancient world. Pine, fir, cypress, cedars, terebinths, palm and fig trees, sycamores, olive-trees, and acacias crown the heights; while wheat, rye, and barley are found in the lower regions, together not only with ordinary fruit, but also with apricots, peaches, pomegranates, almonds, citrons, sugar-cane, grapes, bananas—all growing luxuriantly, and forming a forest of finely tinted foliage. The land further yields silk and cotton, indigo and tobacco; and the modern inhabitants of Shur, like their forefathers of old, drive a profitable traffic with the produce of Mount Lebanon, its timber, wood, and charcoal. Flocks of sheep and goats, and innumerable swarms of bees, supply meat, milk, and honey. The sea furnished shoals of fish, and mollusks for the purple of Tyre. There are no precious metals found anywhere in P.; but it is rich in iron, and the stone-quarries of Lebanon were worked in Solomon's time.

The question of the origin of the Phœnicians has not been solved satisfactorily. Their own account, as preserved by Herodotus, speaks of their having immigrated from the 'Sea called Erythra;' a report confirmed by another passage in his History, and by Justin. Strabo speaks of two islands in the Persian Gulf, called Tyros or Tylos and Aradus, in which temples were found similar to those of the Phœnicians; and the inhabitants of these cities stated that the Phœnicians had left them in order to found new colonies. The Erythrean Sea, in its widest sense, extends from the e. shores of Egypt to the w. shores of India; and since in the book of Genesis Canaan is called the founder of the race—a descendant of Ham, not of Shem—some investigators have inferred that the Persian or Arabian Gulf is the original home of the Phœnicians. Against this notion, however, weighty arguments have been brought, from the genuine traditions of the people itself, as preserved, not in a corrupted Greek shape, but in their myths, in the biblical accounts, and in their language, which ever

in its very oldest remnants (Canaan = Lowland; Sidon = Fishing-place; Giblites = Mountain-people) is purely Semitic. Some investigators assert that Herodotus's (vii. 89) understanding the Persian Gulf as intended by the Erythrean Sea was a misunderstanding, and that the true form of the tradition is preserved by Trogus (Just. xviii. 3, 3), who places the oldest seats of the Phœnicians on the Syrium Stagnum or Dead Sea—with which the Greeks before the time of the Diadochi had no acquaintance—and says that, driven thence by an earthquake, they reached the coast and founded Sidon. This earthquake Bunsen by an ingenious conjecture has identified with that which destroyed Sodom and Gomorrah, and with which Genesis itself connects the migrations of Lot. Nothing is known as to the time at which the first Phœnician settlers entered the country; it seems probable that they did not enter it from one region, but from several sides, and at various periods; and that only very gradually, in the course of long prehistoric centuries, they grew into one nationality, embracing the tribes that inhabited the sea-coast, or Phœnicia proper, from Sidon to Gaza, and the cities north of Sidonia. The latter term included the many separate states originally formed by the various *gentes*, who again, originally, had their own political existence, laws, and even worship. Gradually, however, the larger communities extended their rules over the smaller, or rather combined with them for the formation of a more imposing and important state, into which the different states were merged, without, however, giving up their own individual existence or cultus. The most important of these special tribes or states were the inhabitants of Sidonia—a term expressive of the inhabitants both of the city and of the whole country; the Tyrians, whose settlement, according to their own traditions, was prior to any other Phœnician settlement (about B.C. 2750); and Aradus, founded, according to the native traditions, by Arvadi, 'the brother of Sidon.' From these three tribes—of the Sidonians collectively—are to be distinguished the Giblites, with their two sovereignties Byblus and Berytus, who differed in many respects from the former, and who, it may be presumed, formed at first the ruling state of P., until they were brought under Sidonian dependency. Several smaller tribes or states are mentioned in Scripture—Arke, Sin, Hamath, etc.—but little is known about them.

Of the government and internal constitution of these states or cities, we know almost nothing. There were hereditary monarchs ruling over Sidon, Tyrus, Byblus, Berytus, and Aradus, for whose confirmation, however, the assent of the people was necessary in all cases. By the side of the king stood a powerful assembly, composed of representatives of the old aristocratic families of the land, whose numbers differed at various periods. When Tripolis was founded by Tyrus, Sidon, and Aradus, as a place of joint meeting for their hegemony,

every one of these cities sent 100 senators to watch its special interests at the common meeting; and the senate of Sidon seems, B.C. 4th c., at least, to have consisted of 500–600 elders, some of whom were selected probably more for their wealth than for their noble lineage. The king sometimes combined in his person the office of high-priest. The turbulent seething mass of the people, consisting of the poorer families of Phœnician descent, the immigrants of neighboring tribes, the strangers, and the whole incongruous mass of workmen, tradespeople, sailors, that must have abounded in a commercial and maritime nation like the Phœnicians, and out of whose mass must have arisen at times influential men—was governed, as far as we can learn, as 'constitutionally' as possible. Riddance was made of the unruly spirits in Roman fashion somehow in the colonies, or they were made silent by important places being intrusted to their care under strict supervision from home. Only once or twice do we hear of violent popular outbreaks, in consequence of one of which it was mockingly said that P. had lost all her aristocracy, and what existed of Phœnicians was of the lowest birth, the offspring of slaves. As the riches of all the world accumulated more and more in the Phœnician ports, luxury, and too great a desire to rest and enjoy their possessions in peace, induced the dauntless old pirates to intrust the guard of their cities to the mariners and mercenary soldiers, to Libyans and Lydians—'they of Persia and of Lud and of Phut,' as the prophet Ezekiel has it; though the wild resistance which this small territory offered in her single towns to the enormous armies of Assyria, Babylonia, and Greece, shows that the old spirit had not died out.

The sources for the early Phœnician history are of the scantiest description. Of the annals and state documents which filled the archives of every large city, nothing has survived except a very doubtful record, which Sanchuniathus (q.v.) is said to have compiled, about B.C. 1250, in Phœnician from official documents, and which was translated into Greek by Philo of Byblus, and a fragment of which is preserved by Eusebius. The Bible (principally the prophet Ezekiel), Menander of Ephesus, and Dius, a Phœnician, who wrote the history of Tyre from Tyrian annals—fragments of which are extant in Josephus and Syncellus, Herodotus, Diodorus, Justinus, and others—together with a very few notes scattered throughout the church Fathers, contain the sum of all our information. Four great periods, however, are clearly distinguishable in the history of ancient P. The first comprises the beginnings and the gradual development of the single states and tribes, from their immigration to the historical time when Sidon began to take the lead, about B.C. 1500. The second period dates from the conquest of Palestine by the Hebrews. Sidon had then become already the 'first-born of Kanaan,' as Genesis has it, or 'Sidon Rabbah,' the Great Sidon.

The flourishing state of its commerce and manufactures appears likewise from several passages in Homer. The silver vase proposed by Achilles as a prize in the funeral games in honor of Patroclus was a work of the 'skilful Sidonians;' the garment that Hecuba offers as a propitiatory gift to Minerva was the work of Sidonian women. The gold-edged silver bowl given to Telemachus by Menelaus, Hephaistos had received from the king of the Sidonians. Ulysses is left on the island of Ithaca by the Phœnicians, who sail away to 'well-peopled Sidonia.' The gradual ascendency of the rival city of Tyre marks the beginning of the third period, in which P. reaches the height of its power, in which her ships covered the seas, her commerce embraced the whole known earth, and her innumerable colonies flourished far and near. The first historically recorded item of Tyre's activity is her foundation of Gades, a few years before that of Utica, B.C. 1100. The reason of the sudden greatness of Tyre is found in the defeat of the Sidonians by the king of 'Askalon'—a term probably meant to represent the whole pentapolis of Philistia—about B.C. 1209; in consequence of which, the principal families of Sidon 'emigrated in their ships to Tyre, which [viz., the Island-city] they founded.' B.C. 11th c., in the time of Samuel the prophet, 'the princes of the Tyrians' are already spoken of instead of the Sidonians, as the representatives of P. During the reigns of David and Solomon—under Hiram, B.C. 980–917—the friendliest relations existed between the Hebrews and the Phœnicians: both in the full bloom of their power. Each country needed what the other could supply. Hence their close alliance, which led even to common commercial enterprises in ships built by Solomon, the supercargoes of which belonged to him, while the mariners and pilots were Hiram's.

By this time, Phœnician colonization had reached its utmost extent. In the space of three centuries, B.C. 1300–1000, the Phœnicians had covered all the islands and coasts of the Mediterranean with their forts, their factories, and their cities; and their ships everywhere found their own ports. They had colonized Cyprus, thus commanding the waters of the Levant and the coasts of Syria and Cilicia. Kithion, Amathus (Hamath), Karpasia, Paphos, with its magnificent temple of Ashera, Keryneia, and Lapothos, were some of their principal settlements in those regions. Northward, on the coast of Cilicia, they founded the cities Myriandros, Tarsos, and Soloi. Migrating to the W., they took possession of Rhodes, Crete (compare the myth of Zeus and Europe), Melos, Thera, Oliaros (near Paros), and Cythera on the coast of the Peloponnesus. E. of the Ægean, we find them at Erythræ, and, further, as masters of the islands of Samothrace, Lemnos, and Thasos with its wealth of gold mines. The Ægean Sea, with all its islands, being in their hands, they sailed thence further W., to Sicily, where they settled at Motye, on

the extreme w. point; founded Rus Melkarth, in the s. (Heraclea Minoa); in the n., Machanath (Panormos, Palermo), and, further, Melite (Malta) and Gaulos. They owned Caralis (Cagliari) in Sardinia, Minorca, Iviza (Ebusos), Elba; on the opposite, or African coast, Hippo, Utica, Hadrumetum, Leptis, and some minor island states. From Sardinia and Minorca, the indefatigable mariners went still further w.—through the Straits of Gibraltar to Tarshish (the California of those days), or to Spain, where they founded Gadeir or Cadiz, and, in the s., Karteja, Malaka, and Abdarach. From here, having colonized nearly the whole Spanish coast, they went northward to the tin, islands (Scilly Isles), and to Britain itself. And while they thus explored the regions of the Atlantic, their alliance with the Hebrews had permitted them to find the way to the Indies by the Red Sea. Though their colonization was thus so vast in its range, it was almost confined to the coast, as were their habitations even in their own land. Their inland settlements seem to have been very few. Everywhere they possessed themselves of unoccupied inlets, which they developed into harbors.

The impulse given to industry and the arts by this almost unparalleled extension of their commercial sphere was enormous. Originally only exporters or traders for the wares of Egypt and Assyria, they soon began to manufacture these wares, and drew the whole world into their circle of commerce. As to the early and most extensive commercial intercourse between P. and Greece and her colonies, it is a striking fact that nearly all the Greek names for the principal objects of oriental commerce were Phœnician, or rather Semitic—identical almost with the terms found in the Old Testament. Thus, of spices—myrrh, cassia, cinnamon, galbanum, narde, aloe, crocus, nitron, balsam, etc.; of jewels and precious stones, sapphire, jasper, smaragdos; of fine materials, and garments, byssus, karpasos, sindon, etc.; musical instruments—nabla, tympanon, sambyke, etc.; oriental plants, vessels, and even writing implements. The wealth of silver, iron, tin, and lead was got chiefly from Tartessus. The descriptions of the abundance of precious metals there verge on the fabulous. Thus, the Phœnicians are supposed to have made even their anchors of silver, when they first discovered the country, not knowing how to stow away all the silver in their vessel. What must have been the state of these mines is clear from the fact that, even in the Roman time, 40,000 men were constantly employed as miners, and the state received a clear revenue of 20,500 drachmas daily. The 'Fortunate Islands,' which, according to Diodorus, they discovered after many days' sailing along the coast of Africa, beyond the Straits of Hercules, and which, to judge from the name Purpurariæ given to some islands off the coast of Mauritania, seem to have been the Canaries, yielded them the shell-fish purpura so useful for their dyeing manufactories. Be-

sides their wholesale commerce by fleets and caravans, they appear also to have gone about the interior of Syria and Palestine, retailing their home or foreign produce.

Although the Phœnicians were erroneously believed, by the western tribes, to manufacture all the wares in which they dealt, yet no inconsiderable proportion of them was really their own work. None of their manufactures, however, stood in so high repute throughout antiquity as the purple dye prepared from the muricidæ, a shell-fish of its coast; and none excelled more in it than the Tyrians. Purple was an almost indispensable luxury of antiquity, particularly in Asia. In temples and palaces for gods and men, purple garments, hangings, curtains, and veils were needed; and Alexander the Great found in Susa alone a store of purple worth 5,000 talents. Sidon's principal production was glass—invented there, it was said, by accident; but probably the invention was derived from Egypt, where it was in use long before; the Phœnician glass, however, was always supposed to be the best. The Sidonians knew the use of many of our own contrivances—the blow-pipe, the lathe, and the graver. Hardly less great was the fame of Phœnician metallurgy. Their mining operations in the Lebanon and Cyprus, where they dug for copper; in Thasos, where, according to Herodotus, they overturned a whole mountain in searching for gold; but particularly in Iberia, where at first silver was so abundant that hardly any labor was required to obtain it—were stupendous; and the minute description of the mining-process in Job (xxviii. 1–11) was derived probably from a sight of Phœnician mining-works. That they well understood how to work the metals thus gained has been observed above. The art of founding brass must, indeed, have reached high perfection to enable Hiram Abif to execute such works for Solomon's Temple as they are described in the Bible. No less familiar were they with the art of imitating precious stones, and coloring glass by metallic oxides. To Sidon is further attributed the pre-eminence in the glyptic and plastic arts; and the artists sent by Hiram to Solomon were skilful workers in gold and silver, in brass, in iron, in purple and in blue, in stone and in timber, in fine linen, and the engraving of precious stones. Their architecture seems to have been Cyclopean. Their vessels, originally simple rafts, gradually developed—with the aid of the Lebanon, which afforded inexhaustible supplies of timber, and of Cyprus which possessed all the materials necessary for fitting up a ship from the keel to the sails—into a first-rate fleet of round ships, or gauli, for short or coasting voyages; war-galleys, or triremes; and fifty-oared craft, long in build, and adapted for rapid sailing or rowing. The internal arrangement of these vessels was excellent, and excited the wonder and admiration of the Greeks, by their adaptation at once for navigation, freight, and defense. Their extraordinary three years' voyage of

discovery, undertaken in the service of Necho, round Africa, going out of the Red Sea, and returning by the way of the Straits' mouth, is as well known as their voyages in the service of Solomon.

The golden age of P., during which her colonies, her manufactures, and her commerce were in this most brilliant phase, seems to have waned nearly simultaneously with that of Judæa. As Solomon in the latter, so does Hiram in the former, mark the end of prosperity, riches, and glory. According to a fragment preserved in Menander, Hiram was followed by his son Baleastartus, who died after a short reign of seven years, B.C. 940, and a long series of political calamities and civil wars ensued. The last of Hiram's sons, Pheletus, fell 898 by the hands of Ithobaal, priest of Astarte, into whose family now passed the kingdom of Tyre. He is the Ethbaal mentioned in Scripture as the father of Jezebel, and father-in-law of Ahab; and a peculiar coincidence is the simultaneous mention of the three years' drought in Judæa (to which an end was put by Elijah's prayer) and in P., where relief was obtained by Ithobaal, who seems to have stood in the odor of sanctity. It was during this unhappy period that the celebrated Phœnician princess Elissa, better known as Queen Dido (q.v.), fled, together with some of the most aristocratic families of Sidon, to Libya, where, about B.C. 813, they founded a new city (Kartachadata = Carthage), near the spot of an ancient Sidonian settlement. The fourth and last period of Phœnician history may be dated from the middle of the 8th c., when Shalmaneser, King of Assyria, invaded P., and besieged Tyre five years, but without result; and there is every reason to believe that the peace concluded at the end of this period was very favorable to Tyre. But soon afterward, P. was drawn into the struggle for supremacy between Chaldæa and Egypt, and was conquered by Chaldæa. A further calamity befel P. at the hand of Pharaoh-Apries, who anticipated Nebuchadnezzar's intended attack on Egypt by destroying the Phœnician fleet, conquering the country, and pillaging it. These calamities produced a series of internal troubles, in consequence of which the constitution was constantly changed; and we hear now of a series of kings, and now of provisional *suffetes*—all their reigns being very brief. From that time forward, and even previously, the special histories of Sidon and Tyre, which alternately possessed themselves of the hegemony of Phœnicia, constitute the history also of the country itself: see these two titles. The battle on the Issus terminated even the shadow of P.'s independent existence, and it shared the fate of Alexander's vast empire. B.C. 65 it became, under Roman dominion, part of Syria, and has since shared her fate for good or evil. See SYRIA: SIDON: TYRE: CARTHAGE: also PALESTINE: PHILISTIA.

Religion.—The real character of the religion of the Phœnicians has as yet been imperfectly demonstrated. Deprived of all original and direct information on the

subject, we have to cull what scanty notices we may from Greek and Latin writers, or to gather knowledge from allusions in the Bible. Not a scrap of native literature has survived; and the supposed extracts from a Greek version by Philo, of Sanchuniathus's Phœnician works, found in Eusebius—hitherto our chief source of information—must be used with more than ordinary caution: see SANCHUNIATHUS. Therefore, without entering into futile speculations, we confine ourselves here to a few general and well-ascertained facts; premising, however, that Phœnician theology is far from being a hopeless province, whatever it may now appear. Excavations are in process in all directions, both in the mother country and in the colonies, and new discoveries are constantly brought to light.

The religion of the Phœnicians was, like all ancient Semitic religions—except that of the Hebrews—a kind of pantheistic worship of nature. While Monotheism, with the descendants of Abraham, assumed the existence of a supreme personal being exerting a power within nature, which, according to its own free will, creates and destroys, the rest of the East assumed a Dualism: two elements, a male and a female; or two highest deities, one of whom begets and has the power to destroy, while the other conceives and produces. These two supreme beings were sometimes merged in one deity, with male and female attributes, which spread out into immense ramifications: representatives now of the general powers of nature, now of the particular phenomena in nature or in the life of men. Those religions had deities who ruled over the stars, the elements, the seasons; over special localities, or over certain phases of life. No nation of antiquity perhaps possessed a more endless pantheon than the Phœnicians: a fact easily explained by their peculiar position and relations. Consisting originally of a variety of tribes, each of whom had had their own special deities—though the supreme *Numen*, or the principle of their chief deity, was probably the same with all—those Phœnicians who dwelt in the north differed in some respects, such as the names and attributes of certain gods, from those of the south. Besides this, it must not be forgotten that the period of Phœnician history ranges over 2,000 years, and their political career, as well as their commerce, brought them in close and constant contact with nearly all the civilized nations of the then known world; and being both superstitious (as sailors and traders are prone to be), and possessed of an adaptability to which partly they owed their success in other respects, they easily, or even greedily, received into their wide pantheon those who, albeit the special national gods of others, or because of this very reason, could either harm or benefit them. It may be also that an easy nonchalance about these things, such as the wealthy and aristocratic classes displayed in ancient Rome and elsewhere, and the interest of the priests who received very considerable tithes of every sacrifice

(our information on that point leaves nothing to be desired), went hand in hand to favor the gradual introduction of as many gods and goddesses as pleased the common people. Their proper divisions, however, their real names and derivations, and the history and time of their nationalization, will long continue to puzzle investigators.

Setting aside such more or less vague and undefined names of deities as were common to the whole Semitic stock, and as they are found in the Hebrew records—like *El* (Mighty One), or (in plural) *Elim; Ollonim* [*Elyon*] (the Most High); *Adon* (Lord); *Melech* [*Moloch*] (King); etc.—we find in the first rank of gods (of Tyre and Sidon) Baal (q.v.) and Astarte (q.v.). Baal occurs in two different characters, as it were—as *Baalsamin* (Lord of Heavens), the highest god ruling over the universe, the Zeus Olympios and Jupiter Optimus Maximus; and as *Baal Melkarth*, the special national numen. Baalsamin is originally identical with the Babylonian Bel or Baal. The third highest deity was the goddess Astarte, presumed to be the same as the Ashera whose licentious worship was execrated in the Hebrew Scriptures. She was propitiated (as Venus, goddess and planet) by prostitution. Some have sought to distinguish between the Tyrian and the Sidonian Astarte, and the respective characters of their worship. The Tyrian Astarte was known principally under the name Tanis (q.v.), the Assyro-Persian Tanais, and was married to Baalsamin, and also to Adonis.

The principal deities of northern P.—the non-Sidonian tribes—consisted of a different trias—*El*, *Baaltis*, and *Adonis*. The first was the supposed founder of the two oldest Phœnician cities, Byblus and Berytus, and corresponded to (being originally perhaps identical with) both Baalsamin, as the highest deity, and Melkarth, as the special god of Tyre. Baaltis, Beltis (My Lady—Aphrodite), worshipped at Byblus, Berytus, Aphaka, Arke (Architis), etc., was joined to Adonis (q.v.), whose cultus had been imported from Assyria, and is therefore unknown in the more ancient Phœnician colonies, in Africa and Spain. Byblus called him Adonis Ganas, or Ganan (perhaps Gaavan, the Exalted); near Byblus, we find him worshipped as Elyon (the Highest); as Esmun in Berytus, and perhaps also under the name Memnon, at Apamea, where an annual mourning-festival was celebrated in his honor; further, near the river Bandas at Paltos; and at the river Belus. As Serach (the Brilliant) in Phœnician, and Kharush (the Sun) in Persian, he appears to have had some relation to the star-and-planet worship which became, under Assyrian influence, a prominent feature of the Phœnician religion.

Besides these more or less localized gods and goddesses (*Dii Majores*), a certain number of deities—state and country deities—were worshipped in common by all Phœnician states. They were called the Children of Sadik (the Just), or the Children, or the Patæki (De-

scendants of Phtha), or the eight Kabiri (Strong Ones). They are the maritime gods, and their images were placed on the prows of Phœnician ships. As protectors of navigation, they are identified with the Dioscuri; and again, as representatives of heat, breath, and life, they received the names Lares and Penates. Their individual names are not generally mentioned; they seem (compare Esmun = eighth) to have been merely counted. Their mode of worship was most mysterious—as indeed some of the earliest mysteries were closely connected with it.

Besides these, they worshipped certain phenomena, personified attributes, and qualities. Their planetary divinities were the Sun and his four horses—to whose worship belongs, among others, to a certain extent the annual festival of the Resurrection of the (Tyrian) Herakles, under the emblem of a column in the form of a rising flame (Chaman); the Moon, with her chariot drawn by white bulls; the planet Mars (Aziz or Nergal); Jupiter (Kochab Baal); Venus (Astoret Naamah = lovely Astarte), with her voluptuous cultus; and Saturnus (Moloch Kronos), the evil principle. The elements were revered either in conjunction with certain deities or on their own account. The water, to which sacrifices were offered both of human beings and of animals or fruits, was hallowed in all its shapes—as the sea, as rivers, fountains, lakes—by which people took their most solemn oaths; the fire, in connection with the oldest deity of P.; the light (Moloch); the air and the winds; the earth and all its plants, its forests, and glens, and trees, and especially its mountains, as the 'symbols of the High Ones,' or as 'Faces of God,' e.g., Mount Carmel, Lebanon, Anti-Libanus, and others. Of animal-worship only small traces are found.

Abstract notions and ideas were not omitted. The Year and the Months, Day and Night, Aurora (Lilith), Age and Youth, Art and Love, had their altars. Nor were certain professions and trades without their visible patrons. Thus, there are gods of agriculture and horticulture, like Dagon, the god of grain; a Dionysos, whose Phœnician name is lost, as the god of wine-growers; a god who is the numen of fruit-growing, of pisciculture, of mines, etc. Chthonian gods are not lacking. The god of Death—the king of the lower regions—is Muth = Death (Pluto), who is represented as a small child. His reign was shared by a goddess whose name is vaguely known as Eloti (My Goddess), occasionally identified with Astarte, Dido, Anna, Persephone, Europa, and a great many other deities.

Allusion has been made to the mode of worship of the Phœnicians, and the places chiefly selected for their rites. Mountains, heights, rivers, lakes, fountains, meadows, glens, were, as above noted, the favorite habitations of the gods. But the Phœnicians were also among the first who erected temples. These were generally divided in two parts, containing the sacred arks

(the mystic cists of the Greeks), and the chariots upon which the sacred objects were at times carried about. Not being intended to be prayer-houses, but as dwelling-places for special gods, they were rather small, and did not even contain the altar upon which the sacrifices were offered. This stood generally at the entrance of the temple, and around it the priests and hierodouloi danced in their service. Pure wells and an everlasting fire were the indispensable conditions of a sanctuary. The sacrifices themselves, as far as they consisted of animals, offer great analogies to those of the Jews; but the P. offered also human sacrifices—chiefly first-born male children, as that which the suppliant held dearest—chiefly to Baalsamin, Baal Hamon, and Astarte. Such human sacrifices or burnt-offerings took place annually at the great festivals of expiation; and further, on extraordinary occasions, at the beginning of important enterprises, such as a campaign; and in great casualties: in order to expiate by one sacrifice the sin of all The same fanaticism which fancied the gods best pleased by the offering up of what was most precious led the Phœnician women, like the Babylonian, to sacrifice their honor in honor of Astarte, on certain occasions; so that some sanctuaries became hotbeds of prostitution. Circumcision—another kind of sacrifice—was not common among all the Phœnician tribes, it being a rite sacred principally to El, the god of Berytus and Byblus.

For festivals and pilgrimages in general, see FESTIVALS: GREEK RELIGION: ETC. What is noted under those titles respecting their character in Polytheism (their connection to a great extent with the births, deaths, resurrections, and other personal phases of special deities) holds good here. No doubt, these festivals, like those of the Hebrews, and all other ancient nations, had, besides their religious, also their political and commercial significance; and P. was particularly, by its eminent position in the world's trade, a place toward which flocked on solemn occasions pilgrims from all parts of Asia and Africa. 'Festival Embassies,' as they were called, were dispatched thither from Syria, Arabia, Babylonia, Cappadocia, Cilicia, Egypt, Armenia; even from India, Ethiopia, Persia, and Scythia; and not until the 5th c. after Christ did these pilgrimages to P. entirely cease. One festival is peculiar to Tyre, and, indeed, it is still celebrated by the present inhabitants of Sur—viz., the 'Wedding of the Land-water with the Sea-water.' On these occasions, the people walk in procession to the well near the town-gate, and pour some pails of sea-water into it, to render it clear and sweet again for a long time.

It would be vain to try, with our scanty and adulterated sources, to gain a deeper insight into the ideas attached to the names, attributes, and modes of worship of the deities mentioned, or to speculate on their moral influence on the people of P. That these ideas were eminently practical; that arts and manufactures flour

ished among them more than among any other ancient nation; that they knew how to turn science into money; that they were, in fact, shrewd men of business—all this we know, but little more. Atheists or Pantheists, whichever they must be called in the modern sense of these words, it is extremely doubtful whether they, any more than the uninstructed mass of the Hebrews before the Exile, believed, as a body, in immortality. What was their influence on Greece, Rome, the whole ancient and modern world, in the province of religious thought, there are no means fully to ascertain. Comparative Mythology has a vast field to explore in this direction.

Phœnician Language and Literature.—Except Greek and Latin, no language was so widely known and spoken throughout antiquity as the Phœnician; and monuments of it have been found, and continue to be found, almost all over the ancient world. We can only vaguely speculate on its early history and its various phases, so long as our materials yield so little information on that point. Its decline seems to date from B.C. 8th c., when Aramaisms crept in in overwhelming numbers. Finally, the close contact with, and the everywhere preponderating influence of the Greeks, superceded—chiefly after Alexander's time—the ancient language almost completely; and even coins with Phœnician legends occur not later than B.C. 2d c.—An important Phœnician literature seems to have been extant as late as the 1st c. after Christ, but it has disappeared from the face of the earth. After the second half of the 3d c., the language had vanished entirely in the country itself; and Jerome, who lived in Palestine, mentions the Punic, but never the Phœnician. In the West, it survived to a much later period. In Mauritania and Numidia, it remained, in a corrupted form, the reigning tongue, as late as the 4th c.; and Augustine draws his explanations of Scripture from the Punic current in the 5th c. There was a translation of the whole Bible into Punic made for the use of the Punic Christian churches; and in and near Tripolis and Bizanium, it was the language of the common people till a later period. From the 6th c., however, it rapidly died out, in consequence chiefly of the Vandals, Goths, Moors, and other foreign tribes overrunning the country, and ingrafting their own idioms on the language.

As a branch of the so-called Semitic family of the Hebrews, Syrians, Arabs, etc., the Phœnicians naturally are closely related to these also with respect to language. The affinity of the 'speech of Canaan,' as the Hebrew is called sometimes, with the Phœnician, was indeed remarked at an early period. Augustine, Jerome, and Priscian pointed out—sometimes in order to back some very peculiar notions—how closely these two languages and their dialects were allied. Yet it must be obvious at first sight that, however near the two idioms may originally have stood to each other, the peculiar relations and fortunes of the two races

who spoke them must have produced substantial changes in their structures in the course of time. While the ancient scriptural monuments of the Hebrews—outwardly and inwardly—exhibit a rare unity of idiom and form, the ancient hallowed utterance becoming a type and model for later generations, the Phœnicians, on the other hand, not confined within the narrow limits of their home-country, but mixing freely with all nations of the earth, spreading their own colonies far and near, opened a wide field for the 'development' of their language, rather for its corruption, by its entering into alliance with Libyan in Africa, Sardinia, and Spain; and with Aramaic in n. Phœnicia, Cilicia, perhaps even in Cyprus. Thus it came to pass that the two languages, which originally may have been identical in old Canaan, became more and more widely divergent. To enter into a more detailed disquisition on this or other cognate points seems more hazardous now than it seemed only a very few years ago; for the more numerous our fragmentary discoveries in Phœnician literature are becoming of late, the more evident is it that we are only at the beginning of Phœnician philology.

In structure the Phœnician Language resembles the Hebrew to some extent (see JEWS: SEMITIC LANGUAGES); we therefore simply point out the most palpable differences between them. In the first instance, we observe the very strange fact, that what is considered an archaism or an isolated dictum in Hebrew appears as a common expression in Phœnician. Certain grammatical terminations, obsolete in Hebrew are in use in Phœnician—so that it appears that the Phœnician had retained more of the ancient Canaanite speech than the Hebrew, which gradually transformed and refined it by grammatical niceties. Another feature is the preponderance of the Chaldee, rather Aramaic, words and forms—though here again we are on very dubious ground. It might further be questioned whether our Phœnician Inscriptions—all belonging to a very late period—are not rather a faithful reflection of the Hebrew of their period, which, since B.C. 8th c., had more and more changed into Aramaic. It is certain that the original language of Canaan was perfectly free from Chaldaisms, and that these are but a late corruption—such as we find also in the later books of the Old Test. Yet there are other features quite peculiar to the Phœnician, which—though not of sufficient importance to warrant our separating the dialect entirely from the Hebrew—are of a nature not to be explained by any Semitic analogy; e.g., some differences in pronunciation of vowels, in treatment of consonants, in formation of pronouns, some verbal forms, and words entirely foreign to the Semitic. Again, a distinction is to be made between the Phœnician of P. and that corrupted form of it spoken in the w. colonies, called Punic; and further, that idiom peculiar to the inhabitants of Leptis, called Libyo-Phœnician—a mixture of Phœnician and

Libyan, with vast preponderance, however, of the former element.

The difference in the pronunciation may be characterized briefly as a tendency toward an obscuring or lowering of the vowels: thus, the Hebrew *a* is changed into *o*, the *e* into *i* or *y*, *i* into *y*, sometimes into *u*, and *o* into *u*. Peculiar is also the use of the Hebrew *Ayin* as a vowel (*mater lectionis*), with the pronunciation of *o* or *u:* on some occasions, however, it is entirely omitted. The gutturals are changed at times, as in the corrupted orthography of Samaritan and Sabian; so that *L* and *R* are sometimes assimilated with the next consonant in the middle of the word, or entirely omitted, etc. As to grammar, our knowledge is extremely limited. A few undoubted facts are the termination of the nominative form in *at* instead of the Hebrew *ah*, greater variety of genitive forms in Phœnician, difference in the formation of the pronoun, and identity of the article with that in Hebrew (*ha*). For the Phœnician alphabet, the model of all European alphabets, see ALPHABET.

The Literature of P., in its original form, has, as we said, perished. What traces and fragments remain of it have survived in Greek translations. But from even these small remnants, we can easily imagine the extreme antiquity and the high importance and vast extent of these productions, which, at first, seem to have been chiefly theological or theogonical. Their authors are purported to be the gods themselves, and the writings are accessible only to the priests and to those initiated in the mysteries. From the allegorical explanations of these exalted personages sprang a new branch of sacred literature, of which those fragments of Cosmogony mentioned above are derived. To the literary age of Taaut, Kadmus, Ophion, Esmun, etc., succeeded Thabion, Isiris, Sanchuniathus, and Mochus, who founded the schools of Priests and Prophets. These cultivated the sciences, chiefly the occult ones, magic, and the like. Nearest to the Sacred Literature stands Didactic Poetry, somewhat related to the Orphic, whose chief representatives are Sido, Jopas, etc. The erotic poetry is characterized as very sensuous, both in P. and in the colonies. Of historians are mentioned Mochus, Hypsikrates (Sanchuniathus?), Theodotus, Philostratus, Menander, and others; but these are mere Greek versions of their Phœnician names, and absolutely nothing has been preserved of their writings. Punic literature also is frequently mentioned by Greek and Roman writers. Geography, history, agriculture, were the fields chiefly cultivated by the colonists of Carthage and the West generally.

The monuments that remain to us, and which have enabled us to judge for ourselves of the religion, the language, and the manners of the Phœnicians, are of twofold kind—either legends on coins and lapidary inscriptions, or Phœnician proper nouns and texts embedded in the works of ancient classical or sacred writers. The principal and ever-growing source for our informa-

tion, however, are the monumental inscriptions, of whose existence, till the middle of the 18th c., nothing was known. The most numerous Phœnician remnants have been discovered in the colonies. Richard Pococke first found, on the site of ancient Citium (Larnaka of today), 31 (not 33, as generally stated) Phœnician inscriptions, which he deposited at Oxford (pub. by Swinton 1750). Malta, Sardinia, Carthage, Algiers, Tripolis, Athens, Marseille, each have yielded a considerable number, so that altogether we are now in the possession of about 120 monuments, either votive tablets or tomb inscriptions. The latest and most remarkable are those now in the British Museum, discovered at Carthage a few years ago by N. Davis, consisting of votive tablets, a (doubtful) tombstone, and a sacrificial tariff, which completes another stone found some years ago at Marseille of the same nature; both setting forth the amount of taxes, or rather the proportionate share that the priest was entitled to receive for each sacrifice. An exceedingly valuable trilingual inscription, referring to the gift of an altar vowed to Eshmun-Asklepios, has been discovered recently in Sardinia. (See below.) One of the most important historical monuments is the sarcophagus of Ashmanasar II., King of Sidon (son of Tennes?), found at Tyre 1855, whose age has been conjectured variously between B.C. 11th c. (Ewald)—a most incongruous guess indeed—the 7th c. (Hitzig), the 6th c. (Duc de Luynes), and the 4th c. (Levy), of which we give the commencement, literally translated: 'In the month of Bul, in the 14th year that I reigned, King Ashmanasar, King of the Sidonians, son of King Tebnith, King of the Sidonians—spake King Ashmanasar, King of the Sidonians, saying: Carried away before my time, in the flood of days—in dumbness ceases the son of gods. Dead do I lie in this tomb, in the grave, on the place which I have built. I myself ordain that all the nobles and all the people shall not open this place of rest; they shall not seek for treasures and not carry away the sarcophagus of my resting-place, and not disturb me by mounting the couch of my slumbers. If people should speak to thee [and persuade thee to the contrary], do not listen to them. For all the nobles and all the people who shall open this sarcophagus of the place of rest, or carry away the sarcophagus of my couch, or disturb me upon this resting-place, may they find no rest with the departed; may they not be buried in a tomb, and may no son and successor live after them in their place;' etc.

The votive tablets bear the same character throughout, differing only with respect to the name of the man or woman who placed the tablet in a certain sanctuary in accordance with his or her vow. Their material is mostly limestone or fine sandstone, rarely marble, and they vary from 5 to 15 inches in height, from 4 to 7 in width, and from 1½ to 4 in thickness. Beginning in most cases with the dedication to the god or goddess, or both, thus: '[Sacred] To the god .... [this tablet] which vowed

N., son (daughter) of N. When he (she) heard my voice and blessed,' or 'hear my voice and bless;' etc., the sepulchral tablets generally run somewhat in this manner: 'Stone erected to . . . , who lived . . . years.' —Much in this department remains to be investigated. Even the paleographical side has, notwithstanding all the ready material, not yet been settled satisfactorily. One point, however, is indisputable even now. There are at least two kinds of Phœnician writing distinguished clearly. The older, purer, more orthographical, and more neatly executed, is found in the inscriptions in P., in Malta, Athens, Citium, and Carthage; the younger, corrupted not only in grammar and language, but also in the form of the letters, which are less carefully executed, and even show some strange, probably degenerate characters, is found chiefly on the monuments in Cyprus, Cilicia, Sardinia, Africa, Spain, Numidia, and adjacent parts.

Fig. 1.

i.e , Lerabbath Letanith Pen-Baal
Uleadan Lebaâl Ch[ammon A]
[Sh] Nadar Chanbaâl [Ben Abd]
Ashmun . . . . [Shema]
[Ko]l[a Barcha . . . .

'To the Lady Tanith, the Face of Baal, and to the Lord Baal Chammon [is dedicated this *scil*] which has vowed Hanbaâl [the son of Abd] Ashmun. . . . [When he (or she) hears his voice, may he (or she) bless.]'

Besides these monumental sources for the language, there are a few remnants of it embedded, as we said, in ancient non-Phœnician writings. The Old Test. alone, however, has preserved its words—proper nouns chiefly—unmutilated. Later eastern writers even, besides the Greeks and Romans, have corrupted the spelling to such

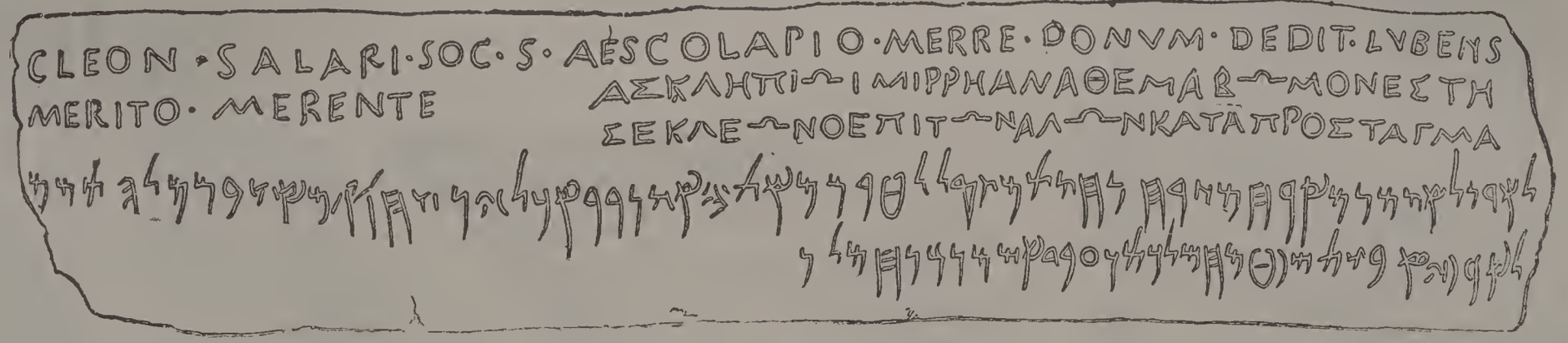


Fig. 2.

The first (Latin) division, consisting of 1¼ lines, reads: 'Cleon. Salari[orum] . Soc[ietatis] . S[ocius, odalis] . Æscolapio . Merre . Donum . Dedit . Lubens . Merito . Merente.'

The second (Greek) division (two half lines) reads: 'Ασκληπιωι Μιρρη Αναθεμα Βωμον Εστησε Κλεων Ο Επι Των Αλων Κατα Προσταγμα.'

The third (Phœnician) division (1½ lines) reads: 'Leadan Leeshmun Maarach Misbach Nechosheth Mishkal Litram Meath [100] Ash Nadar Aklin Shachsag Measher Mimelach Tishm[a K]ola Refia Beshat Sufetim Chamilkat Veâbd Ashmun Ben Chamilk[at].'

a degree that it is often most puzzling to trace the original Semitic words. Phœnician names occur in Suidas, Dioscorides, Apuleius, in martyrologies, calendariums, Acts of Councils, in church Fathers (Augustine, Priscianus, Servus), etc. The only really important remnant of this class, however, is found preserved—albeit greatly mutilated and Latinized—in Plautus's *Pœnulus*, of which act v. s. 1 contains in 16 lines the Phœnician translation of the Latin text, with more than 100 Phœnician words. Several other phrases and words are embodied in act v. ss. 2 and 3 of the same play. Yet, though there is very little doubt among scholars about the greater portion of these texts, the corruption and mutilation which they had to undergo, first at the hands of Plautus, who probably wrote them only from the ear, then at the hands of generations of ignorant scribes, have made more than one word or passage an insoluble puzzle.

Fig. 1, the first of the two specimens of Phœnician [Punic] writing, is taken from one of those Carthaginian votive tablets with which the British Museum (now the wealthiest in Phœnician monuments) has lately been enriched, as mentioned above. The emblems on it are symbolical, and refer to the deities invoked. The lower part is mutilated, but easily supplied. The date is uncertain, perhaps B.C. 2d or 3d c.

Fig. 2 shows a trilingual inscription from a base of an altar, found at Pauli Gerrei, in Sardinia, and fully explained first by Deutsch. (See *Transactions* of the Royal Soc. of Literature, 1864.) Its contents are briefly this: A certain Cleon, Phœnician by religion, Greek by name, Roman by nationality, a salt-farmer, vows an altar—material and weight of which are given only in Phœnician; viz., copper, a hundred pounds in weight—to Eshmun-Æsculapius 'the Healer' (the Phœnician *Mearrach*, clumsily transcribed *Merre* in Latin, and *Mirre* in Greek), in consideration for a cure to be performed. The date, given in Phœnician, viz., the year of two judges, apparently annual, entirely unknown, gives no clew to the time. Paleographical reasons, however, would date it about B.C. 1st c.

Among those who have more or less successfully occupied themselves with Phœnician antiquities, language, and literature, and who have also in some instances deciphered inscriptions, are Scaliger, Bochart, Pococke, Barthelemy, Swinton, Bayer, Dutens, Hamaker, Gesenius, Movers, Munck, Judas, Bargès, De Saulcy, Ewald, Levy, Vaux, Renan, De Luynes, De Vogué, Deutsch, and others; to whose writings, either in special works or scattered in Transactions of learned societies, we refer. Very valuable are Mover's *Phœnizier;* Schröder's *Die Phönizische Sprache;* Renan's *Mémoire* (1860), and his *Mission de Phénicie* (1874); also the relevant portions of the ancient histories of Lenormant, Duncker, and others.

PHŒNICIAN, or PHENICIAN, a. *fē-nĭsh'ĭ-ăn:* pertaining to *Phœnicia.* PHŒNIC'IANS, n. plu. *-ĭ-ănz,* the inhabitants of anc. Phœnicia, the great maritime and commercial people of the anc. world.

PHŒNICOP'TERUS. See FLAMINGO.

PHŒNIX, *fē'nĭks:* mythical Egyptian bird, supposed by some to be a kind of plover, like the *kibitz,* depicted often with human arms, and called in hieroglyphs *rekh.* Others consider it the *bennu,* or nycticorax, a bird sacred to Osiris, and represented watching in the tamarisk over his coffin. The first of these representations has sometimes a star upon the head, supposed to indicate the astronomical period of its appearance. According to one account, it visited Egypt after the death of its father, and entered the shrine particularly dedicated to it at Heliopolis; and there buried its parent, putting the body into an egg or case made of myrrh, and then closing up the egg. Another account is, that the Phœnix, when about to die, made a nest for itself in Arabia, from which a new Phœnix sprang of itself. The bird proceeded to Heliopolis, and there burned and buried its father. But the more popularly known version is, that the Phœnix burned itself, and a new and young Phœnix sprang from the ashes. A less received version is, that a worm crawled out of the body of the dead Phœnix and became the future Phœnix. The Phœnix was, according to the most authentic accounts, supposed to visit Egypt every 500 years; the precise period, however, was not known at Heliopolis, and was a subject of contention till its appearance. The connection of the Phœnix period with that of the Sothiac cycle appears to be generally received by chronologists, as well as the statement of Herrepollo, that it designated the soul and the inundation of the Nile. A great difference of opinion has prevailed about the Phœnix period; according to Ælian, it was a cycle of 500 years; Tacitus seems to make it a cycle of 250 years; Lepsius, 1,500 years. The Phœnix was fabled to have four times appeared in Egypt: 1, under Sesostris; 2, under Amasis, B.C. 569–525; 3, under Ptolemy Philadelphus, B.C. 284–246; lastly, A.D. 34 or 36, just prior to the death of Tiberius. The Phœnix appears also on the coins of Constantine, A.D. 334, 300 years after the death of Christ, who was considered the Phœnix by the monastic writers. It is supposed by the rabbins to be mentioned in Job xxxix. 18, Ps. ciii. 5.—See Herodotus, ii. 73; Achilles Tatius, iii. 25; Tacitus *An.* vi. 28; Tzetzes, *Chil.* v. 397; Lepsius, *Einleit,* 183; *Archæologia,* xxx. 256.

PHŒNIX. See DATE PALM; PALM.

PHŒNIX, *fē'nĭks:* Ala., a city of Lee County, opposite Columbus, Ga., 76 miles northeast of Montgomery and situated on the Central of Georgia Railroad. It was founded just before the war, was incorporated in 1883, received a new charter in 1894, under which it is now

governed by a mayor elected biennially and a city council. It is a city of homes with growing commercial interests. Pop. 4,270.

PHŒNIX: Ariz., city, capital of the Territory and county seat of Maricopa County; on the Santa Fé, Prescott & Phœnix Railroad; in the south central part of the Territory. A short railroad line connects Tempe, on the Santa Fé, eight miles east of Phœnix with Maricopa, on the Southern Pacific Railroad. It was settled in 1870 and in 1881 was incorporated. It is in a mining region, where there is good farm land in the valleys. The chief industrial establishments are stock-yards, machine shops, and large jobbing houses. It is a famous winter resort. Its trade is chiefly in fruits, especially oranges, honey, grain, wine, mining products, and live-stock. The prominent public buildings are the capitol, the agricultural experiment station, insane asylum, court-house, city-hall, churches, and schools. The educational institutions are Academy of the Sacred Heart, Saint John's Indian School (R.C.), a high school, public and parish schools, and a public library. The government is administered under a revised charter of 1893 which provides for a mayor, who holds office two years, and a council. Pop.(1910) 11,134.

PHŒNIXVILLE, *fē'nĭks-vĭl:* Pa., borough, Chester County; at the junction of the Schuylkill River and French Creek; on the Pennsylvania and the Philadelphia & R. R. R.'s, 23 miles northwest of Philadelphia. It was first settled in 1792, and the borough incorporated in 1849. It is an important center of the iron industry, and contains rolling mills, blast furnaces, bridge works and iron mills, including one of the largest plants of the kind in the United States. It also manufactures cotton goods, hosiery, silk and matches. The borough has a public park, a hospital, a public library and good schools. The government is by a council and a burgess who holds office for three years; the public school directors are chosen directly by the people. The waterworks are owned and controlled by the borough. Pop. (1910) 10,743.

PHOLADIDÆ, n. plu. *fō-lăd'ĭ-dē* [Gr. *phōlas* or *phōlăda*, living in dens or caves; *phōleuō*, I lie concealed]: family of boring bivalves, of which the common Pholas (q.v.) is the type, found fossil from the Lias upward. PHOLADOMYA, n. *fō-lăd'ō-mī'ă* [Gr. *maux*, a mussel]: genus of fossil equivalved shells.

PHOLAS, *fō'lăs:* genus of lamellibranchiate mollusks, of family *Pholadidæ*. This family, to which the Shipworm *(Teredo navalis)* also belongs, has the shell gaping at both ends, thin, white, very hard, sometimes with accessory valves; the two principal valves beset with calcareous inequalities, connected by fine transverse parallel ridges, forming a kind of rasp, used by the animal for boring a hole in rock, wood, or other substance, in which it lives. The animal itself is either club-shaped

(as in *Pholas*) or worm-shaped (as in *Teredo*), with large long siphons, often united almost to the end, and a short foot. Several species, natives of British coasts, are popularly called Piddocks: they are used for bait, also for food. How the pholades excavate the holes in which they live, sometimes in clay or mud, but often in chalk and even in much harder rocks, has been the subject of much dispute. An excavating instrument armed with siliceous particles has been ascribed to the animal, but no such instrument exists. The shell is studded with projections, in regular rows, giving it the character of a rasp or file; and the Pholas, fixing itself firmly by its foot, which acts as a sucker, and working itself from side to side, makes use of the rasping power of its shell to enlarge its hole as it has need, so that the hole is always very exactly accommodated to the size of the occupant.

PHOLERITE, n. *fŏl'ĕr-īt* [Gr. *pholis*, a scale]: a mineral formed of small convex scales of a pearly lustre and of pure white color, resembling kaolin in appearance; a hydrated silicate of alumina.

PHOLUS *fō'lŭs:* in the Greek myth, a centaur of the Pholœ, a spur of the Erymanthus range, which separated Elis from Arcadia. When Hercules visited him he opened in his honor a cask of wine the gift of Dionysius, and the other centaurs who had joined in the revel becoming excited with the fumes of the wine fell upon Hercules with sticks and stones. Hercules fought his way out of the cave and slew many of them with his poisoned arrows, putting the rest to flight. Pholus was accidentally wounded by one of the poisoned arrows from which he died.

PHONENDOSCOPE, *fōn-ĕn'dŏ-skōp*, n. [Gr. *phōnē*, voice, sound; *endon*, within; *skopeō*, see]: instrument for discriminating healthy from unhealthy action of physical organs by difference of sound. It is a kind of stethoscope, designed especially for examining internal organs. Its essential principle is much the same as that of the phonograph and the telephone—the duplication by physical means of the minute vibrations on which sounds depend. Minute vibrations, which produce no audible effect in ordinary circumstances, are caught on a thin circular plate of ferrotype, the same material that is used in telephones. Gathering up these sound-waves, the phonendoscope concentrates them into a sort of metal drum. This drum contains a little spring pressing on the vibrator to give it greater play, and has two small holes to admit the sound-waves into its center. On one side is the vibrator, to be laid on whatever part of the body is to be tested; on the other are two little metallic tubes, fastened firmly in and connected directly with the center. To these tubes of metal are attached long, flexible tubes of rubber, with eartips on their ends, intended to be put directly into the ears of the examiner.

PHONETIC, a. *fō-nĕt′ĭk*, or PHONET′ICAL, a. *-ĭ-kăl* [Gr. *phōnētikos*, vocal—from *phōnē*, a sound]: pertaining to the elementary sounds of the human voice; pertaining to written characters representing sounds; vocal. PHONETICS, n. plu. *fō-nĕt′ĭks*, the science of sounds uttered by the human voice, and their various modifications. PHONET′ICALLY, ad. *-lĭ*. PHONICS, n. plu. *fō′nĭks*, the art of combining musical sounds; aconstics. PHONIC, a. *fō′nĭk*, pertaining to. PHONETIC SPELLING, the art or practice of spelling words with letters or characters representing the manner in which they ought to be pronounced. PHONETIC WRITING (see PHONETIC ALPHABET, below).

PHONETIC AL′PHABET, *fō-nĕt′ĭk:* system of symbols representing the elementary sounds of language. All alphabetic writing is essentially phonetic. The invention of letters was the invention of phonetic writing, as distinguished from the older pictorial, or ideographic, writing. From a variety of causes, however, no language has ever been perfectly represented by its spelling, and with the lapse of time the divergence has continually increased, since the spoken words are constantly undergoing change, while the spelling tends to remain fixed. In English especially this divergence has been allowed to proceed to such an extreme that it is universally admitted to be a serious evil; and in recent times various schemes have been projected to remedy it. To these schemes of radically reformed spelling the term phonetic writing is now applied; and what follows represents the views and arguments of the promoters of the movement, and sketches its history.

The earliest attempts at alphabetic writing were as strictly phonetic as the limited scheme of symbols allowed, or as the limited aim of writers required. The alphabets were confined almost exclusively to consonants; and the analysis of speech on which they were based was confined in each case to the language for which the alphabet was designed. When any old alphabet, therefore, came to be adopted for a new language or dialect, it would be found deficient in means for writing any sounds not used in the language for which the alphabet was originally intended. Unless, then, new symbols were added for the new sounds, these latter must have been represented by conventional combinations of letters; and at this point the writing would cease to be perfectly phonetic.

The Sanskrit language furnishes convincing proof of the original phonetic character of alphabetic writing; for not only were words written exactly as they were sounded, but every change which a word underwent in utterance was consistently indicated by a change in the writing. Notwithstanding this fact, there is no language in which the etymological and grammatical relations of words are more clearly exhibited or easily traced than in Sanskrit. The English language illustrates the same principle. No difficulty is experienced in discovering the relation between *loaf* and *loaves*, *wife*

and *wives*, notwithstanding the change of *f* into *v* in the plural; nor would any difficulty be created though the *s* also were changed, as it is in sound, and the words written as they are pronounced—lōvz, wīvz.

The English language embraces in its dialects almost all the elementary sounds of all languages; and the Latin alphabet, which was adopted for English writing, was so insufficient in the number of its characters, that many new letters would have been required to adapt it for representation of Anglo-Saxon and other words. But instead of being extended, the Latin alphabet was reverentially accepted with all its imperfections; its deficiencies were supplemented by use of servile or silent letters, and by various orthographical expedients; thus our writing came to be irregular, difficult, and fluctuating. The great inconvenience, however, of representing by the same character the two sounds of U and V, led to the introduction of U as a new letter for the vowel sound, and to the limitation of V to the consonant sound; and the further ambignity arising from the want of an appropriate sign for the sound of W led to the invention of that symbol, which, being formed by joining together two of the old V characters, was thence called 'double V'—pronounced, according to the old sound of V, 'double U.' The phonetic principle was fully recognized in these changes; and they furnish precedent for further changes, when a necessity for them shall be sufficiently felt and acknowledged.

There can be no doubt that phonetic writing would greatly facilitate acquisition of the power of reading, and consequently would facilitate the education of children and illiterate adults; as well as tend to reduce dialects to one common standard, and further the diffusion of our language in foreign countries. To learn to read from perfectly phonetic characters would be merely to learn the alphabet, and to spell would be merely to analyze pronunciation. A child at school might be made a fluent reader in a few weeks. All uncertainty of pronunciation would vanish at the sight of a word, and dictionaries of pronunciation would be superfluous.

Of all the languages which employ the Latin alphabet, the English is the worst represented; in some measure because of the rich variety of its phonic elements, but chiefly because, of all the nations which have adopted Latin letters, the English have done least to make their writing phonetic. Every attempt to correct the anomalies of our orthography has roused a host of prejudices, either learned or ignorant, against which the efforts of private individuals have been powerless. The difference between phoneticians and their opponents seems a fundamental difference as to what really constitutes a word. The former, maintaining the *sound* to be the true word, would discard all associations dependent on mere letters, in order to represent the exact sound in the simplest manner; the latter, clinging to the literal

associations of orthography, argue as if the verbal cluster of *letters* in reality constituted the word. The dispute is thus, in effect, between letters and sounds: which are the signs—which are the thing signified?

In phonetic writing, the eye would no doubt confound such words as *know* and *no*, *see* and *sea*, *sighs* and *size*, when written separately, as in a vocabulary; but it cannot be supposed that such words would present more ambiguity in contextual usage than they now do in utterance, subject to the same confusion to the ear. At present, we have, in fact, two languages—one purely phonic, addressed to the ear; and the other, in some degree etymological or historical, addressed to the eye. In this respect, we are in a position similar to the Chinese, with their classical ideographic language of literature, and their multitudinous vernacular dialects. To establish the assertion that the phonic word (the sound) written phonetically in a sentence would be less intelligible to the eye than the written word in its present form, it is incumbent on the opponents of phoneticism to show that the simple phonic word is now less intelligible when pronounced in a sentence than its written symbol is when read in a sentence.

The principal objection urged against phonetic writing is, that it would obscure the etymological history now discoverable in the orthography of a word. The best answer to this objection is, that the traces of etymology, preserved in the present spelling, are so imperfect and inconsistent as to be of little value compared with the embarrassments that they occasion in other respects. Further, they can be shown to be at times even misleading as to etymology.

The first requisite for construction of a phonetic alphabet is an exact knowledge of elementary sounds, that every element may be provided with its appropriate symbol, and that no more symbols may be introduced than there are distinct elementary sounds. The latter consideration would be of importance only in connection with a general alphabet available for all languages. An alphabet for any individual language might contain symbols for compound sounds, with no other disadvantage than that of adding to the number of symbols. It would not, for instance, be of any consequence, so far as phonetic writing is concerned, whether the word *sacks* were represented by the letters *saks*, *sacs*, or *sax*, if the symbols used were invariably appropriated to the same sounds. Orthoepists and phoneticians are not agreed as to what elements compose many of our compound sounds, such as those heard in the words *chair*, *queen*, *tune*, *I*, *out*, etc. Any attempt, therefore, at representing compounds analytically would be premature, until the analysis of the compounds had been settled. This analysis would be absolutely necessary for a general alphabet for all languages, but not so for an alphabet for any single language. Phonetic writing, then, should be considered separately—(1) as a means

of representing the elementary sounds of all languages; (2) as a method of symbolizing the pronunciation of any one language only. We are now to consider the attempts that have been made for phonetic writing of English.

Dr. Franklin, 1768, proposed a P. A. for English, in which new symbols were introduced for the vowels heard in the words *on* and *up*, and the four consonants heard in the words *she*, *they*, and *thing*. Many other schemes have been from time to time proposed; but the only alphabets which have been practically applied on a large scale are those of Dr. Comstock in the United States, and Messrs. Ellis and Pitman in England. The object of experimenters in this department has generally been to make use of existing letters as far as possible, using new forms only to supplement deficiencies. The common alphabet has been made to furnish almost a sufficient number of characters by the inversion of some of its letters—thus, ʌ, ɹ, ɐ, ɔ, ə, ƹ, ɥ, etc., as in the 'Anti-absurd' alphabet of Major Beniowski; but the best scheme of phonotypes yet offered was the joint production of Isaac Pitman, inventor of the first system of phonetic shorthand writing, and A. J. Ellis, B.A. of Cambridge, an accomplished mathematician and linguist. This alphabet was completed 1847; and the experiment of its introduction was made with great diligence and perseverance by its promoters, until an army of philanthropic assistants became enlisted in all parts of Great Britain and America. Primers and schoolbooks were issued, and tested on juvenile and adult classes; many works of standard literature, and even the entire Bible, were translated into the new spelling; magazines were published; and ultimately a newspaper, printed in the phonetic character, was started by the enterprising orthographic reformers. In this scheme of phonotypes, diphthongal and articulate compounds were not analyzed, and the letters of the ordinary alphabet were retained in their most common signification, 17 new characters being introduced for unrepresented or ambiguously written sounds. The forms of these were, in most cases, happily suggestive of the displaced orthography, and the general aspect of the writing bore such a resemblance to common typography, that any good reader of the latter could decipher the new printing with ease, after very brief study of the alphabet. The ordinary vowel letters (A, E, I, O, U) were pronounced as in the words *am*, *ell*, *ill*, *on*, *up;* the consonants C and G were sounded as in *came* and *game;* the letters K, Q, X, were rejected as superfluous, and all the other letters of the common alphabet were retained, with their established sounds. Comparing this scheme of letters with the tabulated elementary sounds of English, we find that it represents all the vowels, except the nice varieties heard in the words *air*, *ore*, *err*, *ask;* and that all the consonants are accurately represented except *wh*. The latter element is written by let-

ters sounding *hoo*, so that the words *where* and *whoe'er* are made identical to the eye; and the sentence, 'I saw the man *whet* the knife,' is written, 'I saw the man *who ate* the knife.'

Notwithstanding these imperfections, this alphabet was found to work well among those disposed for a reform. The phonetic method was proved remarkably simple and easy in comparison with the ordinary system; the time occupied in making fluent readers was greatly reduced; and readers of phonetic printing experienced little difficulty in the transition to reading from the common orthography.

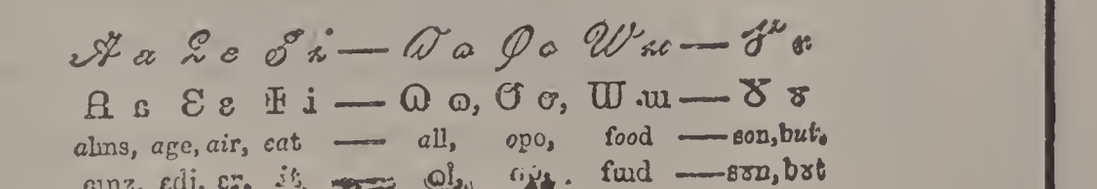
The advantages claimed for the system were chiefly: rapidity of learning to read, certainty of pronunciation, and increased facility in common reading, after the power of phonetic reading had been acquired. The chief disadvantages alleged against the system were: accustoming the eye to a false orthography, and teaching what had to be in great part unlearned after it was acquired. Whether the objectors were right or wrong, they were overpoweringly numerous, and the system failed to do more than prove that phonetic spelling greatly simplifies the acquisition of the power of reading.

The original phonotypic alphabet, described above, has been for some years discarded in the printing issued from the 'Phonetic Institution' (Bath, England), and a more analytic alphabet has been adopted, in which 11, instead of 17, new forms are introduced. The latest edition of this alphabet gives the ordinary vowel letters A, E, I, O, for the sounds in the words *am*, *ell*, *ill*, *on*, and the letter U for the sound in *pull;* K is restored, and C rejected; J is used as in French; and the elementary sound of *wh* is still unacknowledged. The 11 new characters represent the consonants in the words *she*, *oath*, *they*, and (s)*ing;* and the vowels in the words *ale*, *eel*, *alms*, *old*, *all*, *pool*, *up*.

The following are the forms of the new letters as printed and written, with a passage exhibiting their appearance in composition.

This Phonetic Alphabet consists of 34 letters—viz., the 23 useful letters of the common alphabet (*c*, *q*, and *x* being rejected), and the 11 new ones below. *J* is used for the French *j* (zh), or *g* in 'edge,' or *s* in 'vision;' hence *dj* represents *J* in *John*, and *dg* in *edge*. *Tc* (*t sh*) represents *ch* in *chess*, and *tch* in *catch*. *Y* and *w* are consonants; *wh* being replaced by *hw*. The vowels *a*, *e*, *i*, *o*, *u*, have invariably the short sounds heard in *pat*, *pet*, *pit*, *pot*, *put*. All the other old letters have their usual signification. The italic letters in the words in the third line denote the SOUNDS of the letters.

VOWELS.



PHONETIC ALPHABET.

DIPHTHONGS.				CONSONANTS.			
ɛi,	ei,	ɷi,	ou.	Ç ç,	Ђ ђ,	Ⴋ ɗ,	Ŋ ŋ.
ai	*ei*	*ɷi*	*ou*	*Ç ç*	*Ђ ђ*	*Ⴋ ɗ*	*Ŋ ŋ*
ay,	*by,*	*boy,*	*now.*	*she,*	*thin,*	*then,*	*sing.*
ɛi,	bei,	bɷi,	nou.	çi,	ђin,	ɗen,	siŋ.

The double letter *u*, as in *unit, unite, duty, value,* is written thus: 'yuunit, yuneit, diuuti, valiu.' When *ai, ɷi,* make a *dissyllabic* diphthong, the second letter is marked with a diæresis; thus, *solfaïŋ, sɷïŋ.*

"'Tiz ɗe meind ɗat mɛks ɗe bodi ritç;
and az ɗe sɤn brɛks ђrɯ ɗe darkest kloudz,
sɵ onor 'piređ in ɗe minest habit.
Ƕ Hwot! Ƕ iz ɗe djɛ mɵr preçɤs ɗan ɗe lark,
bikɷz hiz feɗerz ar mɵr biuutiful;
or Ƕ iz ɗe ader beter ɗan ɗe il,
bikɷz hiz pɛnted skin kontɛnts ɗe ei.
Ɵ nɵ, gud Kɛt; neiɗer art ɗou ɗe wɤrs
for ɗis puur fɤrnitiur and min arɛ.'

The reduction in the number of letters from that in the Ellis and Pitman alphabet is obtained chiefly at the expense of the phonetic *principle*, in the attempt to analyze diphthongs in writing, before their correct phonic analysis has been ascertained and settled. A method has been proposed by Melville Bell, in which the advantages of phoneticism might be secured, so far as simplifying the acquisition of reading is concerned, without alphabetic change. Thus the orthography and sound are shown together when the words *loaf, debt, wife, wreath, straight*, etc., are printed loaf, debt, wife, wreath, straight, etc.

But the question recurs: Why should established orthography be unphonetic? Or, at least, why should not some national measures be adopted to correct the anomalies of our spelling? A similar work was undertaken by the Spanish Acad. in the middle of the 18th c., and carried out so efficiently that, at the present day, the pronunciation of any word in Spanish is immediately determined with certainty by every reader who knows merely the phonetic value of the alphabetic characters. The writing of the Italian, Dutch, and many other languages also has been successfully phoneticized. A similar result would be attained in English if the work of orthographic revision were submitted to a competent tribunal, and if such changes as might be found necessary were duly sanctioned by authority. New letters should be added to the alphabet for the six unrepresented simple consonant sounds, Sh, Zh, Th, Dh, Wh, Ng; or, at all events, the writing of these elements should be made distinctive; and, with a few rules for distinguishing the vowel sounds, little alteration of spelling would be needed to approximate the writing of English to phonetic accuracy.

A general phonetic alphabet, available for the writing

of all the sounds of human speech, is still a scientific desideratum. Such an alphabet would be of great practical value to travellers, colonists, missionaries, and philologists. Much attention has been given to this subject of late years. In 1854 a conference of philologists was held in London, at which two rival alphabets were produced, one by Prof. Lepsius of Berlin, the other by Prof. Max Müller of Oxford. The former has been adopted by the Church Missionary Soc., but so many local diversities in the value of the characters have been found necessary in different countries, that this 'Universal Alphabet' has been practically split up into several alphabets. The writing is, besides, overladen with diacritical points. In the alphabet of Prof. Max Müller, the latter difficulty is obviated by a free use of compound letters. The *Lectures on the Science of Language* by this author may be consulted with great advantage, both as to the physiology of speech and as to the history of words. In the second series of these Lectures are given diagrams of the organic formation of many of the elements of speech, as well as a comparative table of four alphabets that have been used in the transcription of Sanskrit, and numerous references to the works of continental and other writers who have treated of the science of phonetics.

The most elaborate scheme of a universal alphabet hitherto published is that of A. J. Ellis. In this alphabet 94 sounds are discriminated by means of an ingenious system of compound letters, but the complexity of the writing forbids its 'universal' adoption.

The chief difficulty in construction of a universal alphabet has arisen from lack of a complete classification of elementary sounds; another difficulty has been created by adherence to the inadequate letters of the Roman alphabet. The resolutions of the alphabetic conference were decidedly in favor of Roman letters as the basis of the proposed 'standard' alphabet. But the wisdom of this decision is questionable. No existing alphabet exhibits the natural relations of the sounds that it represents; consequently, though an alphabet physiologically complete were framed, it could not incorporate Roman, Greek, or any other letters at present in use, without sacrificing the most essential qualities of a universal alphabet —simplicity and congruity. Symbols must be devised which would indicate to the eye all the organic relations discoverable by the ear between the various elements, and which would be free from the associations that would attach to adopted letters familiar to the eye with other meanings. This principle has been carried out in the system of *Visible Speech* (q.v.) by Melville Bell.—For phonetic shorthand writing, see SHORTHAND.

PHONOCAMPTIC, a. *fō'nō-kămp'tĭk* [Gr. *phōnē*, sound; *kamptō*, I inflect]: having power to inflect sound, or to turn it from its direction.

PHONOGRAM, n. *fō′nō-grăm* [Gr. *phōnē*, sound; *gramma*, a letter—from *graphō*, I write]: the articulate speech, or musical sounds, as recorded by the phonograph.

PHONOGRAPH, n. *fō′nō-grăf* [Gr. *phōnē*, sound; *graphō*, I write]: mark or letter indicating a distinct spoken sound: remarkable instrument of recent invention which records articulate speech, or musical sounds, on tinfoil, and reproduces them at any subsequent period of time (see below). PHO′NOGRAPH′IC, a. *-grăf′ĭk*, or PHO′NOGRAPH′ICAL, a. *-ĭ-kăl*, pertaining to; representing articulate sounds. PHO′NOGRAPH′ICALLY, ad. *-lĭ*. PHONOGRAPHY, n. *fō-nŏg′ră-fĭ*, the art of representing each of the sounds of speech by a distinctive mark or character; a system of Shorthand (q.v.) writing. PHONOG′RAPHIST, n. *-fĭst*, one who explains the laws of spoken sounds. PHONOG′RAPHER, n. *-fėr*, one versed in the art of phonography. PHONOMETER, n. *fō-nŏm′ĕ-tėr* [prefix *phono-;* Eng. *meter*]: an instrument for ascertaining the number of vibrations of a given sound in a given space of time. PHONOMOTOR, n. *fō-nŏm′o-tėr* [prefix *phono-;* Eng. *motor*]: instrument to illustrate the motive-power of sound; by its means the human voice may be made to perform mechanical work. PHONORGANON, n. *fōn-awr′ga-nŏn*, or PHONOR′GANUM, n. *-nŭm* [prefix *phon-;* Gr. *organon*, an organ]: instrument designed to imitate vocal sounds of speech; a speaking-machine.—*Phonograph*, the apparatus invented in 1877 by Thomas A. Edison (q.v.), differs from the vibrograph and phonautograph. The latter are constructed to record sound-vibrations graphically, while Mr. Edison's invention, properly called the 'Talking Phonograph,' obtains a record by which the sound-vibrations resulting from articulate speech can be mechanically reproduced after any lapse of time. As originally made, the instrument consisted of three parts—the sender, the receiver or recorder, and the transcriber. The sender consisted of a tube, having an open mouthpiece at one end, and bearing at the other end a thin diaphragm of metal or other substance, with a sharp point or style affixed to the centre of its outer surface. The second apparatus consisted of a cylinder, about four inches in diameter, having on its periphery a V-shaped groove cut spirally from end to end. Over this grooved cylinder a sheet of tinfoil was placed, and the sender advanced till the point of the style lightly touched the tinfoil, over the opening of the V-shaped cut. While the words to be recorded were spoken or sung, the cylinder was turned rapidly, the apparatus for moving it giving a lateral as well as a circular motion. The point of the style thus traversed the tinfoil spirally from end to end, and the vibrations in the diaphragm caused by the sounds resulted in a series of indentations in the tinfoil. To reproduce the sounds, the cylinder was again presented to a style attached to a diaphragm, the style being pressed against the tinfoil by a slight spring. The cylinder was then made to re-

volve, and the motion of the style upon the inequalities in the indented tinfoil produced vibrations in the diaphragm corresponding to the sound-caused vibrations originally created in the instrument by the voice. The sounds were thus reproduced with great exactness, but with a softening of the consonants altering to some extent the character of the voice.

The modern phonograph has been introduced as a practical instrument. It differs from the original in many respects. The rotation of the cylinder is automatically governed, and is effected either by foot-power, water-power, or by an electric motor driven from the lighting circuit, or by storage or primary battery. The recording cylinder is hollow, and made of a secret composition resembling wax. It is about 2 inches in diameter, and 4 inches long. The diaphragm, used both for recording and reproducing, is of thin glass. The two styles connected to its centre are of sapphire. The impressions are made directly on the wax cylinder, and are reproduced therefrom. One stylus is used for recording, and the other for reproducing. The cylinder travels longitudinally at the rate of $\frac{1}{100}$ inch for each revolution. One cylinder is sufficient for a long business letter. The sound produced is low, but very distinct. The same cylinder can be used for a great number of reproductions, a good cylinder giving 500 repetitions. If a new inscription is to be recorded, a little planing tool is thrown against it, which planes off the wax in advance of the recording stylus. Thus the cylinder, if used for new work, gradually grows thinner or of less diameter; but as each cut is of microscopic depth, the diminution is immaterial. The cylinders can be sent by mail so as to answer the purpose of a letter, the recipient simply placing them on his own phonograph. Many interesting records of the voices of great singers, orators, statesmen, and others, have been thus obtained and preserved. Hitherto no practical success has been attained in making new cylinders from old ones.

PHONOLITE, n. *fō′nō-līt* [Gr. *phōnē*, sound; *lithos*, a stone]: variety of basalt or greenstone, which rings or clinks with a sort of metallic sound when struck by the hammer; called also *clinkstone:* see CLINK-STONE: FELSPAR.

PHONOLOGY, n. *fō-nŏl′ō-jĭ* [Gr. *phōnē*, sound; *logos*, discourse]: the science of articulate sounds; a treatise on the elementary sounds of speech; phonetics. PHONOLOGICAL, a. *fō′nō-lŏj′ĭ-kăl*, pertaining to.

PHONOMA′NIA: see HOMICIDE (HOMICIDAL MANIA).

PHONOTYPY, n. *fo-nŏt′ĭ-pĭ* [Gr. *phōnē*, sound; *tupos*, a type—from *tuptō*, I strike]: a method of representing each of the sounds of speech by a distinct printed character or letter. PHONOTYPE, n. *fō′nō-tīp*, a printed letter or character representing a sound of speech.

PHORANTHIUM, n. *fō-răn'thĭ-ŭm* [*Gr. phorĕō*, I bear, I carry; *anthos*, a flower]: in *bot.*, a term applied to the receptacle of composite flowers.

PHORMINX, n. *fŏr'mĭngks* [Gr.]: ancient Greek lyre or lute.

PHORMIUM, n. *fŏr'mĭ-ŭm* [Gr. *phormos*, a mat made of flags or rushes]: a genus of plants, the leaves of which furnish fine, silky, and very strong fibres; New Zealand flax, ord. *Liliac'eæ*.

PHOSGENE, n. *fŏs'jēn* [Gr. *phōs*, light; *gennaō*, I produce]: luminous impression produced by pressure on the eyeball. A phosgene usually appears as a luminous centre surrounded by colored or dark rings. Sometimes it seems to consist of bright scintillations of various forms. Similar appearances may be observed at the moments of opening or closing a strong electric current transmitted through the eyeball: see EYE. PHOS'GENE, in chemistry, $COCl_2$, Carbonyl Chloride, Phosgene Gas, Carbon Oxychloride was first obtained by Davy (1812) by direct union of carbon monoxide (CO) and chlorine in sunlight and is still made by same process. A colorless gas with suffocating odor and very disagreeable effect on respiratory organs; on cooling or under pressure it condenses to a low boiling liquid. A very active chemical agent, used in the manufacture of various chemical substances, particularly dye stuffs, it comes on the market as liquid under pressure in steel cylinders or in solution in toluene.

PHOSPHATE, n. *fŏs'fāt* [from *phosphorus*]: a compound of phosphoric acid with a base, of which phosphate of lime is one (see PHOSPHATES, in Physiology). PHOSPHATIC, a. *fŏs-făt'ĭk*, pertaining to phosphate; applied to an acid liquor of an oily nature resulting from the slow oxidation of phosphorus in the air. PHOSPHATIC NODULES, in *geol.*, certain concretions or nodules of phosphate of lime found in layers and bands in the upper greensands of the chalk formation, used, when ground, in the preparation of manures. PHOSPHATE OF LIME, a whitish earthy substance consisting of lime and phosphoric acid occurring in commerce as bone-ash. SUPERPHOSPHATE OF LIME, the phosphate ground to powder and dissolved in sulphuric acid; ground bones dissolved in sulphuric acid; a phosphate containing more phosphorus and less lime than the common phosphate.

PHOS'PHATE ROCK: any rock containing a large amount of phosphoric acid. A massive aluminium phosphate, called 'rotondo-mineral' (Redonda), forms a large deposit on the W. India island Redonda. Phosphorite is a name given to impure, amorphous apatite (which is a lime phosphate), found sometimes in considerable quantities as beds, nodules, or veins, and containing 25 to 80 per cent. of phosphate, or, as in Westphalia, forming 20 per cent. of a phosphoritic slate. Coprolites are an impure lime phosphate. The phosphate beds (pyroclasite)

of S. Carolina underlie a large area, at depth of 1 to 12 ft., and are estimated as yielding 500–1,000 tons to the acre; masses are taken also from the Ashley and Cooper rivers. Extensive detached beds of phosphate rock have been discovered in Florida underlying portions of the cos. of Alachua, Levy, Marion, Citrus, Hernando, Pasco, Hillsborough, Polk and De Soto. The beds seem the eroded remains of a limestone layer phosphatized by guano when Florida was a long narrow peninsula or archipelago, during the middle Tertiary. It occurs also as great sheets of conglomerate derived from the limestone, and as rich river drift. Fair limestone samples average 83 per cent. phosphate of lime, and the conglomerate 73–78 per cent. Two districts in Canada—one in Ottawa co., Quebec, and the other in the cos. of Leeds, Lanark and Frontenac, Ont.—possess large and valuable deposits of phosphate rock.

The origin of phosphate rock is matter of controversy. The theory of Prof. Charles U. Shepard was that the eocene shell-marls were formerly above their present level, receiving deposits of guano and vegetable debris; then depressed, the carbonic acid of the waters dissolving out portions of the soil and the marl beneath, leaving cavities and basins that received deposits of the leached guano, mingled with other substances. Similar stone-guano on Mong's Island, in the Caribbean Sea, is known to originate from the deposits of sea-birds; also on the Mosquito Coast. The Redonda phosphate differs from this, and from that of other W. India islands; it resembles an earthy opal, is grayish, yellowish, or white, often translucent: analysis has yielded percentages of about 43 phosphoric acid, 16 alumina, 14 iron.—See SUPERPHOSPHATE OF LIME.

PHOS'PHATES: Compounds of phosphoric acid with a base. For the means of distinguishing between the salts of tribasic, bibasic, and monobasic phosphoric acids, see PHOSPHORUS. The following have an active part in the chemistry of the animal body:

Phosphate of Soda occurs as a constituent of all the animal fluids and soft tissues of the body, but is abundant especially in the urine and the bile. It is probable that it exists in these fluids principally in the form of di-sodium phosphate (Na_2HPO_4) and to a less extent as the acid phosphate (NaH_2PO_4). Pyrophosphate and metaphosphate of soda (see PHOSPHORUS) are often found in the ashes of animal fluids or tissues after the process of incineration. The phosphates of the alkalies, which occur in the animal body, obviously owe their origin, either directly or indirectly, to the food—viz., directly, by being ingested as phosphates of the alkalies; or indirectly, and probably to a much larger extent, to the oxidation within the body of organic compounds of phosphates. The elimination of these salts from the system is necessary, because they are being constantly

produced by metabolism, and this process is effected mainly by the kidneys and the intestinal canal. In the carnivorous animals, whose blood is much richer in phosphates than that of herbivora (the ash of the blood of the dog, e.g., contains 12 to 14 per cent. of phosphoric acid; while that of the ox or sheep does not contain more than from 4 to 6), these salts are carried off by the urine; but in consequence of the formation of free acids as products of disintegration of the tissues, a portion of the base is abstracted from the originally alkaline phosphates, and a corresponding portion of phosphoric acid is liberated. The originally alkaline salt is thus rendered neutral or even acid; and the occurrence of the acid phosphate of soda NaH_2PO_4 in the urine is thus explained. In the herbivorous animals, on the other hand, the urine contains no phosphates, the whole of the phosphoric acid taken in their food being eliminated by the intestinal canal in the form of the insoluble phosphates of lime and magnesia. Although the general distribution of the phosphates of the alkalies in the nutrient fluids (there is 40 per cent. of them in the ash of the blood-cells; 28.4 per cent. of phosphoric acid and 23.5 of potash in the ash of cows' milk; and about 70 per cent. of phosphoric acid in the ash of the yolk of egg) is in itself an indication of their importance, the exact nature of their functions is not understood. Liebig has specially drawn attention to the peculiar grouping of the acid and alkaline fluids of the animal body. The permanence of this grouping is maintained, especially in herbivorous animals, chiefly by the conversion, within the body, of alkaline and neutral phosphates into acid phosphates by the means above described. Moreover, all tissue-forming substances (the protein bodies) are so closely connected with phosphates, that they remain associated during the solution and subsequent re-precipitation of these substances; and the ash of developed tissues (e.g., muscle, lung, liver, etc.) always affords evidence that acid phosphates existed in the recent tissue; and, further, no exudation from the blood-vessels can undergo transformation into cells and fibres, i.e., become organized, unless, in addition to other conditions, phosphates are present. Another convincing proof of the share taken by the phosphates in the formation and functions of the tissue is the fact that, though herbivorous animals take up a very small quantity of phosphates in their food, and though their blood is very poor in these salts, their tissues contain as large a proportion of phosphates as the corresponding parts of Carnivora. Lastly, the fact that one equivalent of the alkaline phosphate of soda $2(Na_2HPO_4)$ possesses the property of absorbing as much carbonic acid as two equivalents of carbonate of soda leads to the belief that the power of attracting carbonic acid, which the serum of the blood possesses, is due at least as much to the phosphate as to the carbonate of soda; and that, consequently, phosphate

of soda has an important part in the respiratory process.

Phosphate of lime occurs in the organism in two forms, viz.: as tri-calcium phosphate ($Ca_3P_2O_8$), and di-calcium phosphate ($Ca_2H_2P_2O_8$). Tri-calcium phosphate occurs in all the solids and fluids of the body, but is most abundant in the bones, in which it amounts to about 57 per cent., and in the enamel of the teeth, 80 to 90 per cent. It is remarkable that a salt so perfectly insoluble in water as tri-calcium phosphate can be held in solution in the animal fluids. In some fluids, e.g., the blood, it is probably, in part at least, combined with albumen, with which it forms a soluble compound; while in other fluids, e.g., the urine, it is held in solution by a free acid or by certain salts (e.g., chloride of sodium), whose watery solutions are more or less able to dissolve it. If any proof is wanted of the functions of this salt in relation to the bones, it is afforded by the well-known experiment of Chossat, who showed that, when too small a quantity of it is taken with the food, the bones lose more or less of their hardness and firmness, and fractures do not readily unite. Phosphate of lime, like the phosphates of the alkalies, is indispensable to cell-formation; e.g., in the mantle of the mollusks (where new cells for formation of shell abound) this salt is far more abundant than in any other part of the body. As with the phosphates of soda, the greater quantity of the phosphates of lime found in the body is probably ingested in the form of organic compounds of phosphate, rather than as already formed phosphates. Some is also formed within the organism by action of carbonate of lime on the phosphoric acid formed during the disintegration of the phosphorus-containing tissues, e.g., the brain. In man and carnivorous animals, a certain portion of the phosphate of lime is eliminated by the kidneys, and the rest is carried off in the excrements, while in herbivorous animals the whole is carried off in the excrements. The acid phosphate of lime is found occasionally in the urine of man and carnivorous animals, but is of no practical importance. For a notice of the amount of earthy phosphates daily eliminated by the kidneys (see URINE).

Basic Phosphate of Magnesia, $Mg_3P_2O_8$, is analogous, both in chemical and physiological relations, to the corresponding salt of lime, with which it is always associated. The abundance of this salt in the seeds of the cereals, and in the other ordinary articles of vegetable diet, sufficiently explains its presence in the system. A far less amount of this salt, than of the corresponding lime-salt, seems required by the organism, as is shown by the relative quantities in which they occur in bone (57 of the former to 1.3 of the latter), and as is further indicated by the fact that, relatively, far more of this than of the lime-salt escapes intestinal absorption, and appears in the excrements.

PHOSPHATIC DIATHESIS.

The only phosphates remaining to be noticed are *phosphate of ammonia and magnesia*, or, as it is sometimes termed, the triple phosphate, $2MgO.NH_4.PO_4.6H_2O$, which occurs in beautiful prismatic crystals in alkaline urine, and indeed in any specimen of urine that is beginning to putrefy; and *phosphate of soda and ammonia*, found occasionally as a crystalline sediment in putrid urine, and is frequently a constituent of calculi.

PHOSPHAT'IC DIATH'ESIS, in Medicine: condition in which there is a tendency in the urine to deposit *white gravel*. As the deposit of urates (see URIC ACID DIATHESIS) depends on an excessive acidity of the urine, so that of the phosphates is determined by the opposite condition—deficient acidity, or by positive alkalescence. Alkalescence of urine may occur from two distinct causes—viz., (1) from the presence of the carbonate of a fixed alkali (potash or soda), or of alkaline phosphate of soda; or (2) from the presence of the carbonate of the volatile alkali, ammonia, due to the decomposition of urea. This decomposition is due to the fermenting action of the mucus of the bladder on the urea, and is explained by the equation—

$$\overbrace{CON_2H_4}^{\text{Urea.}} + \overbrace{3H_2O}^{\text{Water.}} = \overbrace{2NH_4.CO_3.H_2O.}^{\text{Carbonate of Ammonia.}}$$

The white gravel deposited in the second of these conditions—when the urine contains carbonate of ammonia—is composed of minute shining prismatic crystals of the triple phosphate of ammonia and magnesia (for the formula, see PHOSPHATES). This salt is formed as follows: Healthy urine contains phosphate of magnesia in solution. If, however, the urine become alkaline from decomposition of the urea, a portion of the ammonia combines with the phosphate of magnesia, and forms the triple salt insoluble in the urine, which has now become alkaline. With this triple phosphate, there is almost always an admixture of phosphate of lime ($3CaO.P_2O_5$) in the form of an amorphous precipitate. The tendency to deposit the mixed phosphates (triple phosphate and amorphous phosphate of lime) is observed especially in cases of disease or injury of the spinal cord, and in disease of the bladder, particularly in chronic inflammation of its mucous coat. On allowing urine of this kind, which is usually pale in color, to stand for some time, an iridescent film or pellicle generally forms upon its surface, which, when examined under the microscope, is found to consist mainly of the salts we have described. Such urine speedily becomes putrid, and evolves a strong ammoniacal odor.

The above is by far the most common form of the phosphatic deposits; but the urine may become alkaline from the presence of the carbonate of potash or soda, and then, no ammonia being present, in place of the triple salt, there is a deposition of amorphous phos-

phate of lime, or, in rare cases, of a crystalline stellar phosphate, $2CaO.P_2O_5.H_2O$. In these cases, the urine is alkaline, pale, copious, slightly turbid, of low specific gravity, and of peculiar odor. This urine makes reddened litmus paper *permanently* blue; while ammoniacal urine causes only a temporary change in the color of the same test-paper. As the urine cools, and sometimes even in the bladder, the white sand is deposited, occasionally giving the last portion of the excreted urine a milky appearance. During perfect health, the urine often becomes temporarily alkaline during the act of digestion (when the gastric juice is especially acid); but a continuous general tendency to alkalescence from a fixed alkali, and therefore to phosphatic deposits, is usually associated with general debility. These deposits occur mostly in sallow, languid, unhealthy-looking persons, whose vital energies have been depressed by mental anxiety, by insufficient food, or by sexual excesses.

In both forms of alkaline urine, and therefore of phosphatic deposits, a generous diet and tonics, such as bark, wine, and the mineral acids (before meals), are of great service.

PHOSPHENES, n. plu. *fŏsfĕ-nēz* [Gr. *phōs*, light; *phainō*, I show]: luminous impressions and circles seen with the eyelids closed, after the sudden compression of the eyeball: see PHOSGENE.

PHOSPHIDE, n. *fŏs'fīd* [from *phosphorus*]: a combination of phosphorus with a metal. PHOSPHITE, n. *fŏs'fīt*, a salt of phosphorous acid.

PHOSPHINE, n. *fŏs'fĭn* [Gr. *phōs*, light; *phainō*, I show]: phosphuretted hydrogen gas, a very poisonous body, consisting of one atom of phosphorus and three of hydrogen.

PHOSPHOR-BRONZE, *fŏs'fŏr-brŏnz* [Eng. *phosphorus*, and *bronze*]: alloy of copper, or of copper and tin (bronze), with phosphorus. The purpose in employing the phosphorus is twofold: first, to remove oxygen (present in the copper in the form of suboxide); secondly, to effect chemical union of the phosphorus with the copper or the bronze. Most commercial copper is contaminated by a small proportion of copper suboxide, which renders it less tenacious and less plastic; all ordinary bronze is subject to like contamination from partial oxidation of the tin; the result is lack of homogeneity and solidity. This oxide is removed by introduction into the fused metal of a carefully proportioned amount of phosphorus, which combines with the oxygen, forming phosphate; the latter is eliminated with the slag. The copper or bronze is thus greatly improved as regards tenacity and plasticity. A small excess of phosphorus, combining with the metal or metals, effects still further improvement. Phosphor-bronze containing more than 0.5 per cent. of phosphorus has a color like that of gold, fine

grain, high degree of elastieity, and a high breaking-strain.

PHOSPHORES'CENCE: the phenomenon exhibited by eertain bodies of the emission of light at a temperature below that of incandeseence. Phosphorescence may be due to a variety of eauses: (1) Exposure to a strong light; as, for example, in the ease of the sulphides of caleium, strontium and barium, indurated limestone, ete. (2) Heating to a temperature much below that of red heat, as in the case of fluorspar, lepidolite, diamond, quinine. (3) Friction, as in the case of fused ealcium ehloride and zinc sulphide. (4) Cleavage, as in the ease of mica, the broken surfaces being electrified, one positively and the other negatively. (5) Crystallization, as in the ease of boracie acid after fusion, and of water when frozen rapidly. (6) Roentgen rays (q.v.), eathode rays (q.v.) and the rays from radio-active substanees, such as radium, uranium, ete. (see RADIO-ACTIVITY). The name 'phosphorescenee' is taken from phosphorus, whieh beeomes luminous in the dark by slight friction; e.g., self-luminous figures may be drawn on a wall with a stick of phosphorus or a lueifer mateh. This property of phosphorus has been known for a long time; and when, in the 17th eentury, other substances exhibiting a similar luminosity were discovered, such as chloride of caleium and sulphide of calcium, they were at first called 'Homberg's phosphorus,' 'Canton's phosphorus,' etc. The two phenomena, however, are due to different causes. The luminosity of phosphorus is due to a slow oxidation, while in the ease of the chloride and sulphide of calcium, no chemieal change occurs; and the term *phosphorescence* is now usually restricted to those eases where no ehemieal action ean be deteeted. Phosphorescence has been investigated particularly as a phenomenon due to absorbed light, in connection with fluorescence (q.v.); and in treatises on optics is generally regarded as a special kind of fluorescence, the distinetion generally made being that in fluorescence the radiation of light ceases as soon as the exciting eause is withdrawn, while in phosphorescence it persists for a longer or shorter time. In eases where the luminosity persists for the fraetion of a second only, it is sometimes ealled phosphorescenee and sometimes fluorescence. There is no absolute dividing line between the two phenomena; and the two terms are very apt to be used interehangeably, in popular, and even in scientifie writing. In this sense, it is strietly analogous to, perhaps identieal with, the heating of bodies by exposure to light or radiant heat. They absorb part of the energy of the vibrations whieh fall on them; it beeomes motion of their partieles, and is again radiated from them as light or heat. In view, however, of the faet that the same phenomena may be eaused by frietion, Roentgen rays, eathode rays, ete., it ean be eonceived in a more general way as absorption

of energy of various kinds, which is transformed by the phosphorescent body into light-waves. Rutherford (*Phil. Mag., May,* 1905), has called attention to the fact that the *a*-particle from radium ceases to produce ionization, photographic action and phosphorescence at the same rate of speed; and suggests that fluorescence, phosphorescence and chemical action on the photographic plate are all caused by ionization. The fact that ionization can often be detected as accompanying phosphorescence in cases of friction, cleavage, etc., and the further fact that the ultra-violet rays, which are the most active of the light-rays in producing phosphorescence, are also the rays which produce ionization and chemical action, go to strengthen this view. So that it is possible that in these cases, and even in the case of phosphorescence caused by visible light-rays, some change more complex than has been supposed, may take place.

Phosphorescent light is generally a pale, uncertain, shimmering light, and may be of the most various colors; but, when caused by light, consists, as in the case of fluorescence, of light-waves of greater length (or less refrangibility) than the exciting rays. This was proved by G. G. Stokes, who devised a number of experiments with fluorescent and phosphorescent substances to illustrate it. The violet and ultra-violet rays are the most active in exciting phosphorescence, while the red and infra-red (or heat-) rays often wholly or partially destroy it. Phosphorescence thus offers a method for the study of the ultra-violet and infra-red spectra. If the solar spectrum be cast upon a screen covered with strontium sulphide, the spectrum is extended far beyond the violet rays, which are the last rays ordinarily visible. E. Becquerel discovered that the waves of greater wavelength destroy the phosphorescence. When a calcium sulphide screen is made phosphorescent by exposure to sunlight, and the heat-rays from the infra-red portion of the spectrum are thrown on it, the path of the rays can be traced by dark lines.

The phosphorescence of the sulphides of calcium and barium has been utilized in the manufacture of luminous paints. Substances coated with these paints will emit light for hours after having been exposed to sunlight. With the majority of phosphorescent bodies, however, the duration of phenomenon is very short.

E. Becquerel invented a very ingenious instrument for the study of phosphorescence, called the *phosphoroscope.* The body to be tried is placed in a small drum, which has an opening at each end. In this drum there revolve two disks, mounted on the same axle, and pierced symmetrically with the same number of holes. They are so adjusted, that when a hole in one disk is opposite to the hole in the corresponding end of the drum, the second disk closes the hole at its end of the drum, and *vice versa.* Light is admitted by one of the holes in the drum, so as to fall on the object, and it is examined

through the other hole. It is obvious that when the disks are made to revolve, the object is alternately exposed to light, and presented to the eye. By a train of multiplying wheels, these alternations may be made to succeed each other as rapidly as the observer pleases, and thus the object is presented in the dark to his eye as soon after its exposure to light as may be desired. Almost all bodies are found to be phosphorescent; e.g., some kinds of pink rubies, when exposed to sunshine in this apparatus, appear to glow like live coals in the dark.

Since the discovery of Roentgen rays and radio-activity, phosphorescence has been studied largely in connection with these phenomena. The phosphorescence of the sulphides of calcium and barium is much more brilliant under the influence of Roentgen rays than of light. Calcium tungstate is specially sensitive to Roentgen rays. X-ray shadows of the bones and other organs of the body can be thrown on phosphorescent screens. Roentgen rays also cause phosphorescence in glass, fluorite, some of the rare earths and other substances. The fact that Roentgen rays can neither be refracted, reflected nor polarized, while the phosphorescent light which they cause can be, is a confirmation of the theory that the rays which fall on a phosphorescent body do not leave it as such, but are greatly modified. Phosphorescence is used to detect the presence of radio-activity. Rutherford found that, as a general rule, the rays from radio-active substances cause phosphorescence in the same substances which are excited by ultra-violet light. Zinc sulphide is specially sensitive to the α-radiation of radium. The 'spinthariscope' has been devised by Sir William Crookes for the observation of the phosphorescence caused by the α-radiation on a zinc sulphide screen. Seen through this instrument the phosphorescence seems to consist of numberless scintillations, like tiny sparks struck off from an anvil.

If a piece of radium bromide be held to the forehead a sensation of light is experienced. This is due to the retina of the eye phosphorescing under the influence of the radiation. All the bodily tissues are more or less phosphorescent. Tyndall (*Heat p.* 163) says: 'From the experiments of Drs. Bence, Jones and Dupré, it would seem that there is some substance in the human body resembling the sulphate of quinine, which causes all the tissues of the body to be more or less fluorescent. All animal infusions show this fluorescence. The crystalline lens of the eye exhibits the effect in a very striking manner.'

Many insects and marine animals exhibit phosphorescence. In some cases it would seem to be at least partially voluntary. The causes are obscure, and it is not known just what relation this phosphorescence bears to that of inorganic substances. A phosphorescent appearance is often presented by putrescent animal and vegeta-

ble matter, such as decaying fish, etc., but these are effects of slow combustion, or chemical combination, and are not generally classed among the phenomena of phosphorescence. See LUMINOSITY OF ORGANIC BEINGS.

Consult G. G. Stokes, *On the Change of Refrangibility of Light* (*Phil. Trans.*, 1852); P. G. Tait, *Light;* Tyndall, On Light; Eugene Lommel, The Nature of Light (*Int. Sci. Series*); Rutherford, *Radio-Activity* (Appendix A); E. P. Thompson, *X-Rays.*

PHOSPHORITE, n. *fŏs'fŏr-īt* [from *phosphorus*]: a mineral containing phosphate of lime, and occurring in veins in certain rocks: also called *apatite.* PHOSPHORITIC, a. *fŏs'fŏr-ĭt'ĭk*, pertaining to phosphorite.

PHOSPHORUS, n. *fŏs'fŏr-ŭs* [Gr. *phōsphoros*, light-bringer, the torch-bearer, the morning star—from *phōs*, light; *phorĕō*, I bear or bring]: elementary substance of wax-like consistence, easily made to burn, even by the heat of the fingers or by friction, always luminous in the dark in its ordinary state (see below). PHOS'PHORATED, a. *-ā-tĕd*, combined or saturated with phosphorus. PHOS'PHORATING, imp. PHOS'PHORESCE', v. *-ĕs'*, to give out light in the dark at ordinary temperatures. PHOS'PHORESC'ING, imp. PHOS'PHORESCED', pp. *-ĕst'*. PHOS'PHORESC'ENT, a. *-ĕs'ĕnt*, shining with a faint light in the dark; luminous. PHOS'PHORESC'ENCE, n. *-ĕs'ĕns*, the state of being luminous without sensible heat (see above). PHOSPHORIC, a. *fŏs-fŏr'ĭk*, or PHOSPHOROUS, a. *fŏs'fŏr-ŭs*, pertaining to or obtained from phosphorus. PHOSPHORIC ACID, an acid containing two equivalents of phosphorus and five of oxygen (see PHOSPHORUS, below). PHOSPHOROSCOPE, apparatus invented by Becquerel, to measure the duration of phosphorescence in substances (see PHOSPHORESCENCE, above). PHOSPHOROUS ACID, an acid containing two equivalents of phosphorus and three of oxygen (see PHOSPHORUS, below).

PHOS'PHORUS [symb. P, at. wt. 31, sp. gr. 1.837 at 32° F.]: one of the metalloids, or non-metallic elements. It belongs in group V. of the elements, as arranged according to the Periodic Law (q.v.). It is more closely related chemically to Nitrogen, Arsenic and Antimony than to other members of this group.

This substance affords an excellent example of allotropy: that is to say, it may be made to assume different forms presenting different properties: see ALLOTROPY.

Ordinary phosphorus and the red phosphorus are the only important forms.

Phosphorus at ordinary temperatures when pure is a colorless, solid crystalline substance, having the glistening appearance and consistence of wax, but when exposed to light becomes yellow and then red on the surface; and on cooling becomes brittle, and evolving a disagreeable alliaceous odor, due probably to action of

the oxygen of the air upon it. When melted and cooled quickly it is opaque; when cooled slowly it is nearly as clear as water. It fuses at 111.5° F. (44.2° C.) into a colorless liquid; and if air be excluded, it boils at 554° F. (290°C.), and is converted into a colorless vapor of sp. gr. 62, hydrogen being 1. If, however, it be heated to about 140° F. in the air, it catches fire, burns with brilliant white flame, and is converted into phosphoric acid; indeed, it is so inflammable that it will catch fire at ordinary temperatures by mere friction. As the burns which it occasions are often severe and dangerous, great caution is required in handling it. Burns should be rapidly and thoroughly washed with dilute bleaching powder solution. Because of the readiness with which it catches fire, and of its tendency to oxidize when exposed to the air at a temperature higher than 32° F., it is always kept in water, in which it is practically insoluble. It is slightly soluble in ether, but dissolves freely in benzol, in the fixed and essential oils, and in carbon bisulphide; and by allowing its solution in one of these fluids to fall upon filtering paper, the finely divided phosphorus absorbs oxygen so rapidly as spontaneously to catch fire as soon as the solvent has evaporated. One of the most characteristic properties of phosphorus is that it shines in the dark, probably from the slow combustion which it undergoes; hence its name. For its power of forming ozone (see OZONE). Taken internally, phosphorus is a very powerful irritant poison; and it is the active ingredient of some of the preparations employed for destruction of vermin. Its fumes give rise to a peculiar form of necrosis of the jaw, frequent among makers of lucifer-matches, and not followed, as in ordinary necrosis, by formation of new bone.

The action of light, heat or electricity on phosphorus changes it to the allotropic red phosphorus. Red phosphorus is usually prepared from the ordinary variety by heating the latter in a closed iron vessel to a temperature of 464° F. It was discovered by Schrötter 1845, and is a compact solid amorphous substance of dark red color. It differs much in its properties from common phosphorus, being devoid of odor: does not shine in the dark, undergoes no change when exposed to the air even for years, and cannot be set on fire by friction or percussion. Moreover, it is insoluble in all the solvents of common phosphorus, and is not poisonous. It conducts electricity much better than the ordinary variety. It bears heating to nearly 500° F. (260° C.) without taking fire, and has a specific gravity of 2.11. By using red instead of white phosphorus for lucifer-matches, there is no risk to the health of the operatives. Safety matches ignite on a surface containing a mixture of red phosphorus and sulphide of antimony.

Phosphorus is not found in nature uncombined; but it occurs in rocks of various kinds and ages; and in

some countries abundantly as apatite or phosphorite, both of which consist largely of phosphate of lime. It is found also in the form of coprolites or the dung of extinct animals, and as wavellite (aluminium phosphate) and vivianite (iron phosphate). It is a constituent of a large number of less important minerals. Vast deposits of phosphate of lime have been discovered in recent years in many different countries, the most important deposits being in Algeria. In many volcanic rocks apatite is found in minute crystals or particles, and by decomposition of these rocks it passes into the soil. From the soil, it is extracted by plants, which accumulate it (especially in the seeds of the cereals) in quantity sufficient for the wants of the animals which they supply with food. In the animal system, lime phosphate forms 57 per cent. of the bones; phosphates of the alkalies, especially of soda, occur freely in the animal fluids; and in fibrine, albumen, and nervous matter, phosphorus is universally present, though we do not know in what form of combination it occurs.

Phosphorus was discovered 1669 by Brandt, a Hamburg chemist, who obtained it from urine. Gahn and Scheele were, however, the first to discover its presence in bone, and to employ that material for its preparation. The following is a method for making phosphorus on a large scale: Bones burned to a white ash, or mineral phosphate, apatite, etc., are reduced to powder and mixed with 2-3 of their weight of sulphuric acid diluted with considerable water: this mixture, after standing some hours, is filtered, and the nearly insoluble calcium sulphate is washed. The liquid is then evaporated to a syrupy consistence and mixed with coal-dust, and the desiccation is completed in an iron vessel exposed to a high temperature. The residue, when quite dry, is transferred to fire clay retorts which are exposed to a red heat. Phosphorus rises in vapor, and is conveyed, through a bent tube, into water, in which it condenses in yellow drops. The process occurring in the retort consists essentially in the reduction of hydrated phosphoric acid by carbon, with the formation of hydrogen and carbonic oxide gases. The above process, which was used for many years, has been practically superseded by processes in which the phosphorus is expelled from mineral phosphates by the aid of silica. This procedure was suggested many years ago by Wohler; but did not come into practical use by reason of the very high temperatures required for the reaction. The introduction of the electric furnace has overcome this difficulty, and the greater part of the phosphorus at present manufactured is made by the aid of the electric furnace. The crude phosphorus prepared by either of the foregoing methods is purified by being pressed in a fused state through wash-leather, and forced into tubes, in which it is allowed to solidify, giving it the usual form of *sticks*.

PHOSPHORUS.

Phosphorus forms with oxygen an oxide, P_2O_3 (always produced in small quantity when phosphorus is burned in air, but of no practical importance), and three acids —hypo-phosphorous acid, H_3PO_2, phosphorous acid, H_3PO_3, and phosphoric acid, H_3PO_4. Of these compounds, phosphoric acid is by far the most important.

Phosphoric acid in its anhydrous state, or *phosphoric anhydride*, as it is usually termed, is represented by the formula P_2O_5, and is obtained by burning phosphorus in a jar of perfectly dry atmospheric air or oxygen, when it is deposited in snow-white flakes at the bottom and on the sides of the jar, whence it must be removed by means of a platinum spatula as quickly as possible, because of its attracting moisture from the atmosphere, and placed in a perfectly dry flask. When dropped into water, it combines with it, and dissolves, evolving considerable heat, and emitting a hissing sound as when red-hot iron and water come together. Its strong affinity for water makes this anhydride very useful in the laboratory as a desiccating agent.

There are 3 modifications of phosphoric acid, each possessing the properties of a distinct acid—viz., a monobasic, HPO_3 (meta-phosphoric acid), a tribasic, H_3PO_4, (ortho-phosphoric acid), and a quadribasic, $H_4P_2O_7$ (pyro-phosphoric acid). These retain their characteristic properties when dissolved in water, and combine with 1, 3, or 4 equivalents of bases to form salts, according to the acid employed. In the salts formed by the first acid (meta-phosphoric), the one equivalent of hydrogen is replaced by one equivalent of base; in those formed by the second acid, 3 equivalents of hydrogen may be replaced by 3 of base, or one equivalent of hydrogen alone may be replaced, while the other 2 remain in the salt; while in those formed by the third acid, all 4 equivalents of hydrogen, or 3, or 2, or only 1, may be replaced by base, so that this acid forms 4 sets of salts. Hence phosphoric acid is what is termed a *Polybasic Acid* (q.v.). The ortho-phosphoric acid (H_3PO_4) is by far the most important of these three modifications; and is what is ordinarily meant by phosphoric acid.

Phosphoric Acid, in agriculture, is an essential element of plants and a valuable fertilizer. Though it exists in all soils capable of producing plants, it is in few places abundant, and in many cultivated fields it is the first element to become deficient. It appears in the seeds of plants, and is much more likely to become exhausted in fields producing crops which are allowed to mature than it is where the plants are used in a green state. A provision against the waste of this valuable and costly element is seen in its comparative insolubility and its speedy reversion to this form after it has been made soluble by rains or by chemical action. Formerly the phosphorus removed from the soil by crops was principally supplied by bones; but mineral phosphates now furnish a much cheaper and more abundant

supply. Other sources of supply are: guano, and fish refuse. It occurs also in wood ashes, and in various other fertilizers.

The occurrence of phosphoric acid (in a state of combination) in the three kingdoms of nature was noticed above. The discovery of the acid was made 1740 by Marggraf; the discovery of its true chemical nature is, however, due to Lavoisier; and that of its various modifications and its polybasicity, to the investigations of Graham.

Phosphorous Acid occurs both as an anhydride, P_2O_3, and as a hydrate, H_3PO_3. *Hypophosphorous Acid* (H_3PO_2) is known only in its hydrated condition, in which it occurs as a very acid, colorless, uncrystallizable syrup.

Phosphorus combines with hydrogen in three proportions to form phosphuretted hydrogen gas, PH_3; liquid phosphide of hydrogen, P_2H_4; and solid hydrogen phosphide, P_4H_2 (or P_2H). Of these, the first alone requires notice in these pages. It may be obtained pure by heating phosphorous acid in a small retort, the acid being then resolved into phosphuretted hydrogen (phosphorous trihydride) and phosphoric acid: $4H_3PO_3 = PH_3 + 3H_3PO_4$. The gas thus evolved is colorless, and possesses a characteristic fetid odor. When prepared by another process, from caustic potash and phosphorus, it possesses the remarkable property of taking fire spontaneously in atmospheric air or in oxygen gas, and of resolving itself into anhydrous phosphoric acid and water. There is reason to believe that, as *perfectly pure* phosphuretted hydrogen gas does not possess the power of igniting spontaneously, the self-lighting gas always contains a minute quantity of the vapor of the liquid phosphide (P_2H_4). The luminous phenomenon known as *Will-o'-the-Wisp* has been referred to the natural evolution of the gas. The compounds of phosphorus with sulphur, chlorine, iodine, bromine, etc., are not of practical importance.

Phosphorus is employed in medicine as a nervous stimulant, but its administration must be carefully controlled on account of its poisonous properties. It is, however, very largely used in the form of acid phosphate and hyperphosphites. The symptoms induced by this poison are those of acute inflammation of the stomach and bowels; the treatment is the administration of large quantities of mild demulcent fluids, and of magnesia.

PHOSPHURET, n. *fŏs'fū-rĕt* [from *phosphorus*, on the analogy of *sulphuret*]: a combination of phosphorus with a metal or radical; same as *phosphide*. PHOS'PHURET'TED, a. *-rĕt'ĕd*, combined with phosphorus. Better PHOSPHORET and PHOSPHORETTED.

PHOTALGIA, n. *fō-tăl'jĭ-â* [Gr. *phōs*, light; *algos*, pain]: pain in the eyes, caused by action of light.

PHOTICS, n. *fō'tĭks* [Gr. *pōhs, phōtos*, light]: in *nat. science*, that department which treats of light. The term originated in the U. S. Patent Office, where it is applied to mechanical inventions which pertain to illuminating apparatus.

PHOTINIA, n. *fō-tĭn'ĭ-â* [L. form from Gr. *phōs*, light, with reference to the bright, glowy leaves of the plant denoted by the term]: genus of rosaceous plants—shrubs and trees—of the tribe *Pomeæ*. All the species (30) have evergreen leaves, and produce a berry-like pome of—15 cells, with their partitions. The flowers grow in terminal corymbs or panicles, and are usually white. The species are natives of Japan, China, Nepaul, and one is found in California—*P. arbutifolia*, or May-bush. *P. serrulata*, of which there are several varieties, is the Chinese Hawthorn: both *P. serrulata*, and *P. arbutifolia* are hardy evergreens, attaining a height of 10 ft., and are cultivated as ornamental trees for lawns. In Nepaul the bark of the *P. dubia* is used as a scarlet dye-stuff.

PHOTINIAN, *fō-tĭn'ĭ-an:* member of a sect led by Photinus, Bp. of Sirmium, 14th century. Photinus, like nearly all the heretics of his time, was influenced by the teaching of Arias on the nature (or natures) of Jesus Christ. He was condemned, 344, by a synod at Antioch as an adherent of the homoousian doctrine, and again 345, by a synod at Milan for having developed the homoousian doctrine in a sense antagonistic to the orthodox doctrine of hte divine hypostases.

PHOTIUS, *fō'shĭ-ŭs:* patriarch of Constantinople at a critical period: b. probably between 820 and 825, of a patrician family of Constantinople; d. (as tradition reports) 891, Feb. 6. Distinguished by his abilities, he served in various important public offices, and secured the favor of Emperor Michael and the emperor's uncle and powerful favorite Bardas: in this, his way was opened doubtless by the marriage of his mother's brother to Princess Irene, sister of the empress. The patriarch Ignatius, having in vain, and perhaps too austerely, rebuked Bardas, and then having proceeded to excommunicate him, was deposed and banished under sentence for conspiracy. Photius, though a layman, was appointed in his stead, was hurried in six days through all the stages of sacred orders, and finally installed as patriarch. Two successive councils of bishops, under court influence, confirmed the deposition of Ignatius and the election of Photius. Still, great scandal attached to such proceedings, even though Photius was known to be one of the finest scholars and the most able theologian in the empire. In 862, however, Pope Nicholas I. (q.v.) called a new council at Rome, which declared Photius's election uncanonical and invalid, deposed and excommunicated him, and reinstated Ignatius in his see. Being supported, however, by the emperor, Photius retained possession, and retaliated on the pope by assembling a council at Constan-

tinople 867, in which he raised a controversy of doctrine and discipline between the churches of the East and West themselves. In all these doctrinal differences, the council condemned the Western Church, excommunicated Pope Nicholas and his abettors, and withdrew from the communion of the see of Rome. Michael, having caused the murder of Photius's patron Bardas (866), and being himself assassinated by his colleague Basilius the Macedonian (867), Photius was banished to Cyprus (867, about Sept. 30), and Ignatius reinstated (Nov. 23); and 869, October, the eighth general council (so regarded by the Latins, but rejected as such by the Greek Church), at which Pope Adrian II.'s legates presided, was assembled at Constantinople, being convened to give indisputable legality to Ignatius's restoration. Photius was again condemned and excommunicated, and the intercommunion of the two churches restored. Yet on the death of Ignatius, Photius was reappointed to the patriarchate. In 879 he assembled a new and much larger council at Constantinople (claimed by the Greek Church as the eighth ecumenical), renewed the charge against the Western Church, and erased from the creed, in the article on the Procession of the Holy Ghost (q.v.), the word *Filioque* (q.v.). The pope's legates, who attended this council, were disowned by the pope for their concessions; and Photius was again excommunicated. Thus began the open hostility between the two churches which has continued till this day; the separation of the churches, however, was not completed till the time of Michael Cerularius: see Greek Church. Photius was finally deprived, degraded and exiled to Armenia by Leo, son of Basilius, 866; at this point he strangely disappears from history, and is supposed to have died a few years later, in imprisonment. His chief literary remains are (1) *Myriobiblion*, called also *Bibliotheca*, summary review of 279 works which Photius had read, many of which are now lost; (2) A *Lexicon;* (3) The *Nomocanon*, which is a collection of the acts and decrees of the councils and ecclesiastical laws of the emperors; (4) Several minor theological treatises; (5) A collection of letters, many of them extremely interesting and elegant. See Hergenröther's monograph on Photius (1869).

PHOTO, *fō'tō* [Gr. *phōs* or *phōta;* light]: a common prefix in many compounds, denoting relation to or connection with light: N. a common abbreviation for *photograph* or *photographic picture;* a carte-de-visite.

PHOTO-CHEMISTRY: that branch of chemistry which deals with the chemical changes that are produced by the agency of light. The earliest observed photo-chemical phenomena were the fading of dyes and other colors in a strong light, and the bleaching of linen and similar fabrics, under the influence of sunlight. The oldest known example of the power of light to induce chemical change in an inorganic substance is undoubtedly the blackening

of silver chloride—a phenomenon which has been familiar to chemists since the 16th century. At the present time, the number of known photo-chemical phenomena is so great as to be almost past enumeration. The most important of them all is the decomposition of carbon dioxid gas by the green coloring matter ('chlorophyll') that occurs in the leaves of plants; for it is by means of this decomposition that plants obtain the greater part of the carbon that they subsequently utilize in the formation of wood, and of starches and sugars and other analogous foodstuffs. The carbon dioxid gas that exists in the air is absorbed by the chlorophyll corpuscles in the leaves, and is split up, under the influence of sunlight, into carbon and oxygen. The oxygen is liberated in the free state (in large measure, at all events), and is permitted to escape again into the air. The carbon does not appear to be set free in the elementary state at any stage in the process, but is retained in the leaves in the form of some chemical combination with hydrogen and (probably) oxygen. The precise chemistry of the change is not yet definitely known; but we may perhaps say, with Sachs, that the 'first *obvious* product' which is formed in the leaves is starch.

In the blackening of silver chloride there appears to be an elimination of chloride and, under ordinary circumstances, a simultaneous absorption of oxygen; the silver chloride (AgCl) being partially converted into an oxychloride, whose formula has been given as Ag_4OCl_2 by Hodgkinson, and as Ag_2ClO by Baker. Light acts in an analogous manner upon the other haloid salts of silver; but it appears that the decomposition can never proceed far, in any case, unless some substance is present which is capable of absorbing the liberated halogen. Moisture suffices as the absorbent in the case of the chloride and bromide of silver; but its sufficiency in the case of the iodide depends upon the way in which that salt is prepared. In photography, all three of these salts of silver are used, the chloride being employed in the preparation of positive prints, while the bromide and iodide are used in the manufacture of the negative plates. It is probable that an organic compound of silver is formed in the course of the manufacture of the emulsions that are employed in modern dry-plate photography, this organic compound being (as experience indicates) exceedingly sensitive to the action of light, becoming transformed with extraordinary facility into unstable compounds which are readily reducible by the subsequent action of the reducing agents that are technically known as 'developers.'

It was formerly customary to consider sunlight as divisible into three essentially different kinds of rays, which were known, respectively, as 'heat rays,' 'light rays' and 'actinic (or chemical) rays'; heat rays including those parts of the radiation which are distinguished by a relatively long wave-length, and which are mostly

confined to the red and the infra-red parts of the solar spectrum; light rays including those parts which strongly affect the human eye; and actinic rays including those parts of the total radiation which are capable of effecting chemical changes, and which were formerly considered to be mostly confined to the violet and ultra-violet parts of the spectrum. In modern physics this distinction has largely disappeared, especially with respect to the actinic rays; for while it is still admitted that it is chiefly the violet and ultra-violet rays that are concerned in the reduction of silver salts, it is also recognized that many other chemical changes depend for their production upon rays of much greater wave-length. Many changes are known, for example, which are undoubtedly induced by the action of the red and infra-red rays, which have been ordinarily classified as 'heat rays.' (Consult, for example, Tyndall, *Contributions to Molecular Physics in the Domain of Radiant Heat.*)

The action of light upon a gaseous mixture composed of equal volumes of hydrogen and chlorine has been studied extensively, chiefly by Draper, and by Bunsen and Roscoe. When a mixture of this kind is exposed to strong sunlight, its constituents combine explosively, with the formation of hydrochloric acid gas; but when exposed to a subdued light, they combine slowly and with considerable regularity. Draper invented an instrument (the 'actinometer') for the measurement of the actinic power of a given source of light, basing its operations upon the rapidity with which combination takes place in a mixture of hydrogen and chlorine, when exposed to the light whose chemical power is to be determined. The instrument consisted of a bulb that was filled partially with water and partially with the mixed gases, and which was also provided with a graduated capillary stem, in which a column of mercury or of water served as an index for the determination of any change of volume in the gaseous mixture in the bulb. When the bulb was exposed to a subdued light for a definite time, the hydrogen and chlorine combined partially, and the hydrochloric acid gas that was formed was almost immediately absorbed by the water, in which it is exceedingly soluble. The volume of the gases in the bulb therefore suffered a reduction, which was proportional to the total amount of chemical change induced by the light; and the extent of this reduction in volume was indicated by the movement of the index-liquid in the graduated stem of the instrument. Draper's actinometer was open to two general objections. In the first place (as Draper himself discovered in 1843), the combination of hydrogen and chlorine, in a diffuse light, does not proceed at a rate that is strictly proportional to the time. The further researches of Bunsen and Roscoe showed that the action of the light, in Draper's actinometer, is at first very slow indeed, and that the rate of combination increases, after the lapse of a certain time, up to a maximum value which is there-

after constantly maintained. In some of the experiments it was found that the chemical action during the seventh minute of exposure of the instrument was nearly as great as the total action during the first six minutes, and that the action during the eighth minute was fifty per cent greater than that during the seventh minute. In these particular experiments the instrument could not be relied upon until after the lapse of eight minutes; and the initial period of irregularity would of course be different under other intensities of illumination. Great differences in the indications of the Draper instrument were also found to result from apparently trivial variations in the relative quantities of hydrogen and chlorine present. The second objection to the Draper actinometer is that it can indicate nothing but the power of the light under examination to induce the combination of hydrogen and chlorine, or to perform some other change that depends upon light of the same wave-length as that concerned in this particular effect. A similar objection may be urged, it is true, against every form of actinometer; for no instrument can be constructed which will indicate anything about light of other wave lengths than those that are concerned in its own operation. The point of the criticism is, however, that in estimating the power of a given light to perform a given kind of chemical change, it is essential that the actinometer that is adopted shall depend for its action upon the same wave-lengths as those that are concerned in the phenomenon for whose study the actinometer is employed. It is not logical, for example, to use the Draper actinometer for determining the power of a given light to affect the reduction of the halogen salts of silver, unless it is first proved that the combination of hydrogen and chlorine, and the blackening of silver salts, are affected by the action of light-rays of substantially equal wave-lengths. The commonest problem in actinometry at the present time is the determination of the time of exposure in the taking of photographic pictures; and when an actinometer is employed for this purpose, it usually consists of a strip of sensitive paper which is exposed until it darkens to a definite shade; the time required for this blackening being taken as an index of the intensity of the light, so far as its power of reducing silver salts is concerned. It is possible that the initial slowness with which diffuse daylight induces the combination of hydrogen and chlorine is a characteristic common, to a greater or lesser extent, to all photographic processes; but familiar experience in the taking of so-called 'instantaneous' photographs indicates that if this initial slowness exists in the case of the modern dry-plate, its period is exceedingly short.

PHOTO-CHRONOGRAPH, *fō-tō-krŏn'ō-grăf* [Gr. *phōs*, light; Eng. *Chronograph* (q.v.)]: instrument for taking photographs instantaneously and at regular (usually very short) intervals, so as to show the different phases of the

motions of an object moving, or otherwise undergoing change—e.g., a horse trotting, bird flying, etc.

PHO'TO-COLLOTYPE: a modern process of printing from the surface of a film of gelatine. A piece of plate glass is coated thickly with a solution of gelatine and potassium bichromate, dried in the dark, and exposed to light under a reversed positive. It is next turned over and exposed, through the glass, to diffused light for a short time to diminish the swelling caused by the subsequent wetting. After well washing to remove the superfluous bichromate, it is rolled with greasy ink which only adheres perfectly to the parts which have not absorbed water, and to the others in proportion to their dryness. The subsequent manipulations are as in lithography.

PHO'TO-ELEC'TRIC MICROSCOPE: a microscope illuminated by the electric light so that the image of the magnified body can be thrown on a screen in a darkened room.

PHOTO-ELECTROTYPE, *fō'tō-ē-lĕk'trō-tīp* [Gr. *phōs*, light; Eng. *Electrotype* (q.v.)]: printing-block or plate made mainly with the aid of photography and of the electrotyping process.

PHOTO-ENGRAVING: a general term covering various processes by which the action of light upon suitably sensitive surfaces is made to yield plates from which facsimilies of photographs or drawings may be printed. The processes that are commonly and very successfully employed at present are dependent upon the properties of various substances such as gelatine or similar bodies to undergo certain changes under the action of light.

If a thin layer of asphaltum be spread upon a metal plate and exposed to the light under a negative or positive, the parts under the clear parts of the screen either positive or negative become insoluble, while those under the dense parts remain soluble. When the plate is then washed with a suitable solvent, the soluble parts will be removed, the hardened parts remaining. The plate can then be etched, the asphaltum serving as an etching ground. The result is a relief plate if the black parts of the design were hardened under a negative, an intaglio plate if the whites were hardened under a positive.

Albumen, or white of egg, is soluble in cold water even if allowed to dry. If mixed with a solution of potassium bichromate and spread upon a surface and dried, it still remains soluble as long as it is not exposed to light. Albumen when combined with potassium bichromate acts like asphaltum subject to certain modifications in handling.

If gelatine be mixed with potassium bichromate it retains its qualities if left in the dark, but, exposed to light, it acquires the power of resistance to mordants according to the degree of exposure. These peculiarities of the various substances mentioned have been used to

further the work of the photo-mechanical processes. The aim of them all is to reproduce any photograph or drawing into a block or printing plate without the intervention of other than mechanical means.

The familiar half-tone so generally employed in modern periodicals and books is a very beautiful and successful result of the special application of the action of light upon a properly prepared copper plate. It is dependent for its printing qualities upon the interposition of the so-called half-tone screen between the object photographed and the negative. This screen is made up of pieces of glass that have been very finely ruled and put together in such a way as to make of the intersecting lines a great number of minute dots or stipples. The effect of this upon the negative is to break up the flat surfaces into a corresponding texture of dots, their size depending upon the relative darks and lights of the original. It is in fact a general stippling of the surface affording a grain to which the ink may cling. The very name half-tone suggests limitations, pure whites are only obtained by further manipulation. The fineness or delicacy of the resulting plate is of course dependent upon the character of the screen used. In some of the most beautiful reproductions of to-day, there are as many as 200 or even 300 lines to the square inch. In such cases, however, successful printing is only possible with the very finest paper and the most experienced and careful press work. For ordinary commercial work the screen is rarely over 150 lines to the inch.

In making the half-tone, a negative in reverse made with the screen is put into contact with a highly polished metal plate, usually copper, which has been properly sensitized or coated with a preparation of fish glue, bichromate of ammonia, albumen and water. It is then exposed to the light and afterward washed in water. Those parts which have been protected from the light by the denser portion of the negative will be washed out and the other portions in varying degrees. The plate is then dried and burned in over a suitable heater, when it is ready for etching. Few half-tones are satisfactory if left without considerable after work. In most of them their deficiencies are made up by the skilful handwork of an experienced wood engraver. This combination of the mechanical process with hand work, however, is best omitted unless the engraving is done with judgment. Too many of the plates printed from to-day are neither fish nor fowl. The delicate tints of the plate are so engraved away as to destroy its original qualities without adding anything to its value as an engraving. Mechanical in the broad sense, there is yet abundant opportunity in the making of half-tones for the exercise of superior judgment and taste. Much depends upon the skill of the photographer and upon the just degree of etching.

The half-tone more than any other of the photo-

mechanical processes, has helped to advance and develop American illustrative art. Before its employment, drawings in wash or color had to be re-drawn on the wood block in black and white and in reverse. This limited both the mediums employed and greatly hampered the comparatively few artists who had either the time or inclination to learn to draw in the special way required. With the advent of the half-tone, artists could draw as they chose; size was no consideration for the photographic reproduction allowed for any reduction necessary. Again, there were artists whose work suffered materially at the hands of the engraver; the resulting print was only a fair interpretation, not a facsimile in black and white. The relative small cost of the half-toñe, too, has permitted of the freer use of illustrations, and has brought out the work of many men who have attained high places in American art. There have been many claimants for the invention of the half-tone, but it is pretty generally conceded that F. S. Ives, of Philadelphia, was one of the first to make it practicable in 1881. The Meisenbach process, patented in 1882, was the first screen process to be used in a large way. The half-tone, as has been previously said, is employed chiefly in the reproduction of photographs or drawings in which there are tints and masses involving delicate gradations.

For the reproduction of drawings in line or stipple, the process is much simpler, very inexpensive and capable of great expedition. In this work the metal employed is usually a zinc plate coated with asphaltum or with albumen mixed with bicromate and exposed under a reversed black and white negative made from the drawing to be reproduced. After exposure it is washed with a solvent that removes the unchanged part of the coating, leaving the lines of the design in hardened albumen or asphaltum upon the plate. It is then etched into relief and the rough places gone over with a graver and the blank spaces or pure whites routed out. As with the half-tone plate it is then mounted on a block type-high and is ready to print.

Another familiar process employed in the reproduction of line work is known as the swell gelatine process. A bichromatized gelatine film is laid on a glass plate and exposed under a black and white negative. The film is then soaked in water which causes the lines which were protected by the dark parts of the negative to swell up while the others do not swell. The film is then a mold or matrix from which a wax or plaster impression may be taken, and from this an electrotype can be made. This is a more difficult and uncertain process, however, and is not very generally employed. There are other variations in the processes of reproducing line work, which we have not room to detail here.

Thus far we have dealt with the commoner or more generally employed relief processes. Another most beautiful process involving just the reverse of the methods

employed in the half-tone is known as photogravure. It may be employed either in the reproduction of drawings, in tint or pure line, and the results are a fascinating richness of texture, a velvety quality that is especially adapted for the reproduction of paintings or old etchings. Some of the most sumptuous and valuable art works of our time are illustrated by the use of the photogravure, and it is constantly employed in the reproduction of drawings and prints of the old masters. One of the simpler methods of producing a photogravure plate is as follows: A copper-plate covered with asphaltum or albumen mixed with a bichromate and exposed under a black and white *positive*. The parts under the clear spaces of the positive are hardened, those under the opaque places corresponding to the lines of the original remain soluble. Washing with a solvent bares the metal in the soluble places, and the plate is then etched, the hardened coating forming a resist. A grain is obtained in this process by first sprinkling the plate with powdered resin which is made to adhere by heating. Photo-aquatint is another familiar method for the reproduction of intaglio half-tone plates. There are a number of processes known under various names that are somewhat similar in general character and involve adaptations in the use of sensitized gelatine. Among these, the best known are the Woodburytype, the stannotype, the heliotype, the collotype and the autotype.

With the advent of color in the pages of our leading magazines, a new impetus has been given toward the development of methods by which direct reproductions can be made of colored originals. In the so-called three-color process much has been accomplished, but very much still remains to be done. The process is based upon the theory that all the colors in the chromatic scale may be derived from the three primaries, red, blue and yellow. In making the half-tone negatives from a colored original, ray filters are used, which are transparent color mediums that permit only certain rays to be effective in the photographic plate. The resulting plates printed the one upon the other in just the proper shades of red, blue and yellow, ought to result, theoretically, in an exact copy of the original. As a matter of fact thus far these color reproductions have at best but fair approximations. One chief reason for this is the limitation of effect involved in any superposition of colors, and this is particularly evident when applied to the use of colored printing inks. Other reasons for the lack of complete success in this work are the difficulties of securing absolutely correct negatives, exact registration in the printing and just the right shades of the primaries. In some directions, notably in the reproduction of certain textiles, the three-color process has been successful, but as yet it retains many crudities and is far from being satisfactory when employed in the copying of paintings. There are a number of modifications of this process, and very

often the employment of a fourth printing in a carefully harmonized tint does much to soften and blend the ordinary colors employed.

In all the various processes employed in photo-engraving, much has to be left to the skill of the operator. Certainly we owe much to the men who have done their part toward furthering the advancement of the mechanical processes. While the general principles and processes employed in these reproductive arts are well known and common property, there are yet many special adaptations and more or less secret methods that have grown out of special experimentation and experience.

Modern art has been brought into the household by our illustrative magazines and papers, and the art of all time can be studied in the cheap reproductions made possible by these modern photographic processes.

PHOTO-ETCHING *fō-tō-ĕch'ĭng* [Gr. *phōs*, light; Eng. *etching*]: process of photo-engraving by which a photographed figure transferred to a metal surface is produced thereon by the action of an acid.

PHOTOGALVANOGRAPHY, *fō-tō-găl-va-nŏg'ra-fĭ* [Gr. *phōs*, light; Eng. *galvanography*]: process for obtaining an intaglio gutta-percha plate for press-printing.

PHOTOGEN, n. *fō'tō-jĕn* [Gr. *phōs* or *phōta*, light; *gennăō*, I generate or produce]: in *chem.*, an inflammable hydrocarbon; another name for paraffin oil. PHOTOGENE, n. *fō'tō-jēn*, the generation of a more or less continued picture on the retina from a previous impression, or from a delay of the obliteration of it. PHO'TOGEN'IC, a. *-jĕn'ĭk*, produced or created by light, as a picture, on the retina of the eye. PHOTOGENY, n. *fō-tŏj'ĕ-nĭ*, the art of producing pictures by the action of light. PHOTOGEN'IC DRAW'ING, picture produced by the action of light; photograph: In a restricted sense, figure of a translucent object made by confining it under glass, over a sensitive film, and exposing it to light; the process is much used in reproducing mechanical drawings.

PHOTOGLYPHY, *fō-tŏg'lĭ-fĭ* [Gr. *phōs*, light; *gluphein*, to engrave]: engraving by means of light and chemical action; in particular, the production, by such means, of a plate of letter-press which can be employed in the printing-press like an ordinary electrotype plate. The page of letter-press to be reproduced is photographed on the sensitized surface of a sheet of gelatin, and the resulting impression rendered insoluble under the action of acid. When acid is poured over the sheet of gelatin, it eats away so much of the surface as has not been made refractory by the action of light; thus the letters are made to stand in relief. The gelatin sheet is cemented on wooden blocks after the manner of electroplates, and is used in the ordinary printing-press for printing editions of books.

PHOTOGRAPHY, n. *fō-tŏg′ră-fĭ* [Gr. *phōs* or *phōta*, light; *graphō*, I write]: the art or practice of producing pictures of objects, on chemically prepared bodies, such as glass, paper, etc., by the action of light; sun-painting. PHOTOGRAPH, n. *fō′tō-grăf*, a picture or portrait obtained by the light of the sun. PHO′TOGRAPH′IC, a. *-grăf′ĭk*, or PHO′TOGRAPH′ICAL, a. *-ĭ-kăl*, pert. to or done by photography. PHO′TOGRAPH′ICALLY, ad. *-lĭ*. PHOTOGRAPHER, n. *fō-tŏg′ră-fẽr*, or PHOTOG′RAPHIST, n. *-fĭst*, one skilled in the practice of photography. PHOTOGRAPHIC PROCESSES (see below: also PHOTO-PROCESS). PHOTOHELIOGRAPHY (see HELIOTYPOGRAPHY). PHOTOLITHOGRAPHY, n. *fō′tō-lĭth-ŏg′ră-fĭ* [Gr. *lithos*, a stone]: a method of producing a copy of a print or drawing in line—of the same or altered dimensions—on a lithographic stone by means of photography.—*Photography*, as the art of producing images upon a surface by the action of light, has been developed in a great number of processes. Rays of light possess, in addition to their heating and lighting power, what is known as *actinic* or chemical power. This fact is seen in many cases, and is familiar in the fading of carpets and other dyed fabrics, when exposed to the sun. If over a readily faded material an opaque object is placed, and the whole is exposed to the sun, after a time an image giving the contour of the object will be produced by the fading of the unprotected parts of the fabric surrounding it, while the parts covered by the object retain their color. This would be a true photograph. Many chemical compounds are far more sensitive to light than the most fugitive dyes, and several of these are utilized in P. The above example of P. illustrates what is known as 'contact-printing.' For work in the field, it is obvious that this would not answer, as contact would be quite impracticable. Accordingly, the Camera Obscura (q.v.) is used to produce a focal image. In the exact plane of the image, a plate or film of some material sensitive to light is exposed for a short time to the rays reflected by objects, next passing through the lens, and finally coming to the conjugate foci in the locus of the focal image. This is the process of exposing the plate, often called taking the 'exposure.' The plate is unchanged, to all appearance, and shows no image; but it has been affected chemically, and those portions on which the light has acted are thrown into a state of unstable equilibrium; and on treatment with proper reducing agents, the image gradually appears. Next, by immersion in a solution which dissolves unaltered silver salts, the image alone is left on the plate, forming a negative, from which, by contact-printing, a positive is produced. At the outset, therefore, the terms 'positive' and 'negative,' constantly used in photography, are to be explained. In their ordinary meaning, one is the reverse of the other, as regards light and shade. But with respect to a photographic picture on glass, its being a positive or a negative really depends on whether it is viewed by reflected

or by transmitted light. Daguerreotypes all are positives, because they are taken on metal plates, and can be seen only by reflected light. Our picture on glass also is positive when viewed in the same way; but as glass is transparent, the picture is negative when looked at by transmitted light—i.e., when held between the eye and the light. Those portions of the image which are light in the positive way are dark in the negative way. This will be quite plain to any one who looks at such a picture by both lights, laying it on black cloth for the positive view. The old 'ambrotype' was a negative on glass backed by a black coating, so that the transparent portions of the glass appeared black. The 'ferrotype,' still in use, is a negative on black-varnished iron. The black varnish shows through the transparent portions of the film, giving the desired effect. For convenience, it has become the practice to call a photographic picture a negative if it is intended to print positive pictures from it. In a negative, the parts intended to print black on the paper are completely transparent, the whites are completely opaque, and the gradations between are the intermediate shades. Usually, the negative is on glass, and the positives are prints on paper; but negatives are sometimes produced on paper made translucent by means of wax or castor-oil, or they may be on gelatin films. Films of celluloid are now largely used for negatives, the celluloid being supplied as a roll, enough for a large number of pictures. The entire roll is attached to the camera, and can be entirely used before removal, if desired. A photographer generally manipulates his picture differently, according as he intends it for a negative or a positive, so that a photograph on glass can scarcely be at the same time a pleasing positive and a good negative; but this is a mere technical detail.

History.—It is usual to regard the observation by the alchemists of the 16th c. that *Luna Cornea*, or Horn Silver, argentic or silver chloride, is blackened on exposure to light, as the first important step in the history of photography. This property of chloride of silver, also the darkening of nitrate of silver by light in the presence of organic matter, constitute the leading facts on which the science of photography is based. In 1777 the famous Swedish chemist Scheele found by experiment that silver chloride was blackened quickest by the violet rays of the solar spectrum, thus proving that the rays of light are not all alike chemically active. A quarter of a century later, Ritter of Jena demonstrated the existence of chemically active non-visible rays beyond the violet rays of the spectrum.

The honor of having been the first to produce pictures by action of light on a sensitized surface is now generally conceded to Thomas Wedgwood, an account of whose researches was published 1802 in the *Journal of the Royal Institution*, under the title: 'An Account of a Method of copying Paintings upon Glass and of making

Profiles by the agency of Light upon Nitrate of Silver; with Observations by H. Davy.' The misfortune was that no attempts made either by Wedgwood or Davy to prevent the uncolored portions from being acted on by light (or, as we now say, to *fix* the picture) were successful.

M. Niepce of Chalon-on-the-Saone, France, was the first to enjoy the satisfaction of producing *permanent* pictures by the influence of solar radiations. This was accomplished 1814, and the name chosen to designate his process was Heliography. It consisted in coating a piece of plated silver or glass with asphaltum (bitumen). The plate so prepared was then exposed in the camera obscura for a length of time, varying from four to six hours. Wherever the light acted, it rendered the asphaltum insoluble in certain essential oils. Hence, on subsequent treatment with one of these solvents, the shadows of the image dissolved away, and the lights were represented by the insoluble asphaltum remaining on the plate.

Daguerre appears to have begun 1824 the experiments which eventually led to the discovery of the daguerreotype process. On Daguerre's learning that Niepce was working in the same direction as himself, the two formed a partnership 1829. The discovery of the daguerreotype was announced 1839, Jan., but the details of the process were not made public till Aug. following. It consists in exposing a metal plate covered with iodide of silver for 20 minutes in a photographic camera, the plate being afterward transferred to a dark room, and exposed to the vapor of mercury, which develops the latent image, hitherto quite invisible, and which is afterward fixed (see DAGUERREOTYPE). Although this process has become almost obsolete, it was really the first which was of any practical value. While Daguerre's processes for the purpose were imperfect, he succeeded in fixing his pictures; though it was Sir John Herschel who announced the great suitability of the hyposulphites for dissolving the haloid salts of silver.

1839, Jan. 31, H. Fox Talbot read a paper to the Royal Soc. on 'Photogenic Drawings,' just six months previous to the publication of Daguerre's process. He produced these in this way : Writing-paper was steeped in a solution of common salt, and dried : it was then dipped in a solution of nitrate of silver, which is changed by the action of the common salt into the chloride of silver, some of the nitrate, however, remaining unaltered. Paper so treated is extremely sensitive to light, so that when a fern-leaf, e.g., is placed close down upon it between two plates of glass, the paper blackens except where it is covered; thus a reversed picture, or silhouette of the leaf in white, on a black ground, is obtained. This *negative* was then placed over another sheet of paper, prepared in the same way, and the light allowed to act through it. Another picture of

the leaf was thus produced, but this time with the lights and shades unreversed; in other words, a *positive* print, or silhouette in black, on a white ground, was got. A large number of these positives were obtained from one negative. Talbot fixed the print with bromide of potassium.

The Calotype process was patented by Fox Talbot 1841: it is sometimes called the Talbotype process. He had now so far perfected a photographic process that the steps in it remain practically the same to the present day, though the materials used differ to some extent. Talbot produced his negative by preparing paper on the surface with iodide of silver, subsequently washing it over with a mixture of nitrate of silver, with gallic and acetic acids, and then exposing it in the camera to the object that he wished to copy. The invisible image or picture thus obtained was developed by aceto-nitrate of silver and gallic acid, and fixed with bromide of potassium. The paper negative was then waxed to make it transparent, or, more properly, translucent, and used for production of many positives in the way described above.

Photographic Apparatus.—The most important piece of apparatus used by the photographer is the Camera Obscura (q.v.), generally called simply a camera. On the front portion, a suitable glass lens is fixed, which throws the image on a ground-glass screen placed at the back, to enable it to be sharply focused. A thin, flat box with a sliding shutter, together called a 'plate-holder,' contains the sensitized plate. Generally, plate-holders are arranged to contain two plates: such are provided with two sliding shutters, one on each face. When the picture is focused, the screen is withdrawn, and the plateholder inserted in its place; the shutter is then drawn out, and the sensitized plate, which exactly occupies the place of the glass screen, being now exposed, receives the picture. In a brief time, which now varies from a fraction of one second to several seconds in a good light, the shutter is closed, and the plate-holder returned to a dark room, where the plate is taken out and developed.

For general purposes, it is desirable that the camera should be as portable as possible, consistent with strength; consequently it is made usually in the bellows form, so that it will fold into small space. The tripod stand which supports the camera also requires to be light and strong; and the legs may be very light, yet not shake with the wind, as no view involving time exposure (i.e., not instantaneous) can be taken except when the camera is perfectly steady. If a dark tent is not used, it is necessary, when working in the field, to take as many dry, sensitive plates, put up into double plate-holders, as one intends to use in one day, unless a 'changing box,' or one of the rolling films above alluded to, be adopted. The tent is now generally discarded.

Lenses.—The quality, as well as the kind, of lens used

is of great importance. For the different forms and properties of LENSES, see LENS: a few words follow here about the kinds used in photography. A lens which is well adapted for taking portraits or other objects in a room is not suitable for taking landscapes. In the first case, it is necessary for the lens to give only a sharp definition of a figure a few feet off, and to do its work rapidly; while what is required in the other case is that distant objects, lying in far different planes, should be clearly defined. To effect this, the curves of the lenses, as well as their distance apart in the compound arrangement, must be different in each case. For ordinary landscape-work, indeed, a single lens of the meniscus form may be used, as the distortion that it gives is not much noticed; but a properly constructed double lens is better. When architectural subjects are to be photographed, a combination of lenses which correct all distortion must be adopted; otherwise vertical lines converge, and therefore appear out of the perpendicular. What is called a 'wide-angle' doublet lens is used for taking a view of a building in a narrow street, for interiors, and for similar cases, in which the operator cannot retire far enough to take in the whole object with an ordinary lens. A doublet lens of the ordinary kind for landscape-work embraces an angle of about 50°, while a wide-angle doublet embraces 90°, or even 100°; that is, these lenses cover circles whose respective diameters subtend angles of 50° and 90°—100° from their optical centres.

A diaphragm or stop is used with the lens. This is a thin piece of metal perforated with a hole. Different sizes of stops are used, the largest aperture of which is much less in diameter than the lens itself. The aperture is placed opposite the centre of the lens. Since the central rays and the marginal rays have different points of intersection, the object would be wanting in definition if all the rays were used.

Wet Collodion Process.—Collodion (q.v.) is the name given to a solution of gun-cotton in a mixture of ether and alcohol. When this is spread over a glass plate, it gradually dries into a transparent film. It was introduced for photographic purposes first 1851 by Scott Archer, and has been of great service. For fully a quarter of a century, the wet collodion process was almost exclusively practiced by photographers. Dry collodion processes also have been in use, though on a much more limited scale. All these are now mostly superseded by a method in which gelatin takes the place of collodion. These are the stages in the wet collodion process: (1) A glass plate made perfectly clean is coated with collodion, to which salts, such as the bromide of cadmium, and either iodide of potassium or iodide of ammonium, have been added. (2) The collodionized plate is 'sensitized' by immersion in a bath of nitrate of silver containing 35 grains to every ounce of distilled water. (3) Production of latent image by exposing the sensitized

plate in the camera obscura after the object has been focused. (4) Development of latent into visible image by flooding the plate with a solution of some reducing agent, such as sulphate of iron (ferrous sulphate), or of pyrogallic acid, to which are added a little bicarbonate of soda, potassium bromide, some alcohol or acetic acid, as required (5) Fixing of the permanent image by immersion of the plate in some solvent of the unactinized silver salts—i.e., of those parts of the sensitive surface upon which the light has not acted.

For negatives from which paper positives are to be printed, the solvent is a solution of hyposulphite of soda (sodium hyposulphite).

For positives—i.e., where the original photograph on glass is to be kept as a positive, as in the ambrotype and ferrotype processes—the solvent is cyanide of potassium.

Dry-Plate Processes.—It is sufficient merely to mention a few of the earlier dry-plate processes, since except for experimental purposes they all have been superseded by the modern gelatino-bromide process. Several advantages arise, especially for field-work, from using dry, sensitive plates. With the wet process, the operator, when away from his studio, must take with him a dark tent, collodion, a silver bath, and developing agents; but these *impedimenta* are not required with dry plates. Dry-plate processes are of two principal kinds: (1) Those in which the collodion is applied to the glass plate, and afterward sensitized in the silver bath, as in the wet way, but with a preservative such as albumen 'flowed' over the surface, and the plate allowed to dry. (2) Emulsion processes, in which the sensitive silver salt is held in suspension in the collodion or gelatin. A good emulsion can be prepared by adding some soluble bromide, such as bromide of cadmium, to the collodion, and afterward an alcoholic solution of nitrate of silver. The glass plates are simply coated with this emulsion, and set aside to dry, when they are ready for use. The gelatin emulsion is now almost universally used for dry plates, and the latter are made by several makers in immense quantities.

The earliest form of the gelatino-bromide process, at present employed, appears due to Dr. Maddox, who published the details of a workable emulsion of this nature 1871. The process was improved 1873 by Kennett, and again 1878 by Charles Bennett. It was found that if the emulsion was kept at a temperature of 90° F. for some days, or boiled for half an hour, the sensitiveness of the plate coated by it was so greatly increased that a view which could not formerly be taken in less than 30 seconds could now be taken in one. A very sensitive gelatin emulsion can be formed also by using ammonia with the bromide of silver. Dry plates produced by some form of the gelatino-bromide process are now manufactured on a large scale. When properly made, they will keep for an indefinite time, and they can be

developed months after having been exposed. Dry plates can now be made so very sensitive that in a good light a negative can be taken in an undetermined fraction of a second. To obtain a well-defined photograph of an express train in motion, of a swallow poising, or of moving waves or clouds, is no longer difficult. Cannon-balls in motion, as projected from the gun, have been photographed. In taking these photographs, what is called an 'instantaneous shutter' is generally employed for the lens of the camera—i.e., a cover which by some means, such as a spring, will admit light for only a fraction of a second. For the instantaneous shutter, Marcy & Anschutz have substituted a disk or a curtain with a radial aperture or a long slit, moved rapidly across the face of the sensitized plate in the camera.

Photographic Printing: Silver Prints.—As above stated, the production of a silver print on paper depends on the action of light on chloride of silver. The process until recently was conducted in essentially the same way as it was originally by Fox Talbot. The paper is now manufactured already sensitized, and with gelatine sizing in place of the albumen. The paper is exposed to light under a negative and pressed close to it in a printing frame. In a short time a print is obtained, which is fixed by hyposulphate of soda. The details of the process are briefly as follow:

(1) Suitable paper is coated on the surface with a smooth, thin layer of albumen, to which chloride of sodium or of ammonium has been added. (Occasionally, the paper is salted only—i.e., impregnated with chloride of sodium or common salt.)

(2) Silvering of the paper by floating it, albumen side downward, on a solution of nitrate of silver, 60 grains of this substance being used for every ounce of water: it is afterward dried.

(3) Exposure to light. The silvered paper is exposed behind the negative in a printing-frame with a glass front: the time of exposure varies from ten minutes to two or three hours, but occasionally much longer, according to the brightness of the light and the character of the negative. A visible image formed by reduction of the silver salts is produced. The frame is arranged to allow of inspection of the picture from time to time.

(4) Toning. To give a pleasing color to the print, or to insure its permanency, it is usual to tone it in a solution of trichloride of gold.

(5) Fixing. The print, when taken from the toning bath, is steeped in a solution of hyposulphite of soda, which removes the undarkened silver salt, and thus fixes the image.

(6) Washing. Silver prints require to be washed thoroughly after treatment with the hyposulphite of soda. Imperfectly washed prints soon spot and fade.

Orthochromatic Photography.—Different colors possess different actinism as regards the light which they reflect. Hence, in a photograph, many colors take dark

which to the eye appear light. Among these is yellow, which, being non-actinic, does not affect the plate, but produces a transparent image on the negative, giving a black on the positive. In general terms, a photograph is taken principally by the violet rays of the spectrum. To overcome this is the object of orthochromatic P. A screen of yellow glass is inserted between the two lenses of the objective, or the film itself is dyed with an aniline color: the effect is to cut off the violet rays and cause the photograph to be taken by the less actinic rays of the less refracted end of the spectrum. Very elegant effects are thus produced, especially where autumn foliage or highly colored subjects are to be taken.

Photography in Natural Colors.—This is still an unattained dream except by an indirect method. Almost as soon as it was found possible to make photographs in monotone, scientists began to look for some method of reproducing nature in color. About 1839 Fox Talbot found that the colors of glass transparencies were reproduced to some extent in contact printing with silver chloride. Sir John Herschel, at about the same time, worked on an almost identical investigation. Herschel also experimented with the juices of flowers, but found that life was essential to their chromatic action. Poitevin, De St. Florien, Besquerel, and Niepce de St. Victor also experimented in this line, but met with no marked success. The only methods which have as yet afforded successful results are based on the trichromatic process of color analysis. This was first suggested by Prof. James Clerk Maxwell in a lecture before the Royal Institution in 1861. The process consists essentially in (1) the production of three photographic images which represent the physiological analysis of all colors into three simple spectrum colors and which constitute a color record, and (2) synthesis by optical superposition of the three elements of the color record in the three simple colors, whereby the sensations of all the original colors are reproduced to the eye. The next published suggestion after Maxwell's was made by Henry Collen in 1865, in a letter to the *British Journal of Photography*. This was followed in 1868 by an application for a patent on the trichromatic principle by Louis Ducos du Hauron. About the same date a system of trichromatic photography was proposed by Charles Cros of Paris. In 1888 Frederic E. Ives (q.v.), of Philadelphia, perfected a method of color analysis and synthesis based on Maxwell's suggestion. By this method three photographic images are obtained through red, green and blue screens, from which three transparencies are made. When these are placed in his optical instrument, called "photochromoscope," one image is produced which gives all the colors of the original object. The photo-chromoscope is so arranged that the transparencies are viewed under the same colors re-

spectively as those under which they were photographed, and are superposed by reflectors, so that they form one image. Somewhat less perfect results are afforded in prints on glass or paper by various printing processes. Such color prints, made in the type press from three half-tone process blocks, a method also invented by Mr. Ives, are coming into extensive use for book and periodical illustration. In 1891 Prof. Lippmann, of Paris, announced a method of direct color photography which consisted in employing a very translucent film of silver bromide in albumen or gelatine, backed up by metallic mercury. The incident rays, passing through the sensitive film, were reflected back upon themselves by the mercury surface and formed interference lamina within the film. These lamina were then fixed by the photographic process. The colors produced were similar to Newton's ring colors, and a few remarkable examples have been produced. At present, however, the process is only of scientific interest.

Bromide Printing.—This method has become quite popular lately, especially with amateur photographers. The paper is sensitized with a slow bromide of silver emulsion, coated on it in practically the same manner as a dry plate. It is printed for a short time by artificial light behind the negative, then developed, and fixed the same as a dry plate.

Platinotype or Platinum Printing Process.—This kind of printing is much used, as the prints are believed to be permanent, and they are liked by some for their appearance, which differs considerably from that of silver prints. Capt. Abney, F.R.S., thus describes the method which gives the best results: 'Mr. W. Willis, Jr., found that he could obtain an image in platinum black, by means of development, if he sensitized his paper with ferric oxalate, with which was mixed a solution of chloro-platinite of potassium. The action of light on this paper is to reduce the ferric salt to the ferrous state; and when the ferrous salt is in solution, the platinous salt is reduced by it. By floating the exposed paper on a solution of neutral potassium oxalate, which is a solvent of the ferrous oxalate, the platinum salt in contact with it is immediately reduced to the metallic state, and an image is thus built up. To fix the prints, they are immersed in dilute hydrochloric acid, which dissolves away any ferric oxalate there may be, and also gets rid of any oxalate of lime.'

The Carbon Printing Processes.—So far back as 1839, Mungo Ponton announced that paper steeped in bichromate of potash, and dried, changed its color when exposed to light. It was subsequently discovered that light not only alters the composition of the bichromate, but also oxidizes the size (gelatin) of the paper. Gum, starch, and albumen also were found to become, like gelatin, insoluble when exposed in contact with the bichromate of potash to the action of light. Swan, Wood-

bury, the Autotype Co., and others have utilized this property of gelatin in their processes. In order to see clearly the effect of light on bichromatized gelatin, Capt. Abney suggests that these three simple experiments be tried: Prepare pieces of paper by brushing them over with a viscous solution of gelatin, in which is dissolved six per cent. of bichromate of potash, and expose them beneath negatives of line-engravings. On immersing one of them in cold water, it will be noticed that the parts protected from the light immediately begin to swell through the absorption of water, while those portions unprotected remain unchanged. On immersing another sheet in hot water, the protected gelatin will dissolve away entirely, while the rest will remain firmly attached to the surface of the paper. Let a third sheet of the exposed gelatinized paper be brushed over with thin, greasy, lithographic ink, and, after soaking in cold water, a wet sponge may be applied to remove all the ink that will come away. It will be found that the non-absorbent parts retain the ink, while the others reject it.

Swan's Carbon Process.—This is understood to be the first of the permanent printing processes with pigmented gelatin which was commercially successful. In its main features, it resembles what is now called the autotype process. By Swan's method, the paper is coated with a layer or thick film of gelatin which has been previously colored all through its thickness with some permanent pigment such as lamp-black. This color is made of carbon in the state of fine soot—hence the name given to the process. The paper so coated is sensitized with ammonium bichromate, and then exposed under a negative till it is supposed to be sufficiently printed. In this case the image is not seen as in a silver print; in a certain sense it is latent; therefore some indirect plan of telling the proper time of exposure, such as by the use of an actinometer, must be resorted to. The change which takes place in the gelatin film is this: The surface of it next the negative has been rendered insoluble wherever the light has acted, and that to a depth corresponding to the intensity of the light. It results from this that almost the whole surface of the gelatin has been rendered insoluble, but to the greatest depth where the light has acted most strongly. Insoluble portions, however, remain inclosed between its surface and the paper. No picture is visible till these are removed. In this process, the external surface of the exposed gelatin is cemented to a second sheet of paper by a solution of India-rubber. Therefore the gelatin layer, with its undeveloped image, is now placed between two sheets of paper; but when it is immersed in hot water, the original backing of paper is easily stripped off, after which the soluble gelatin dissolves away, leaving a picture in pigmented and insoluble gelatin. The image is, however, reversed, so that an object such as a tree seen on the right in the negative now appears on the left in the print: this is obviated by the

use of a reversed negative, or by making a double transfer.

A formula for 'pigmented tissue,' as the prepared paper used for prints of this type is called, can be made with a gelatin solution thus composed: *Autotype formula:* flake gelatin, 1,500 grains; brown sugar, 150 grains; honey soap, 150 grains; glycerine, $\frac{3}{4}$ oz.; water, 14 oz.: lamp-black or some other pigment is added, with a little warm gelatin and glycerine. The solution is made hot in a porcelain dish, and the paper floated over it. In Swan's process, the undeveloped gelatin print adheres to the paper support to which it is transferred, by a solution of India-rubber: in an improved process, called the autotype, it is transferred to a paper made impervious to water by a coating of insoluble gelatin. An application of pressure with a flat bar of wood covered with India-rubber, called a squilgee, causes the exposed print to adhere to the impervious paper; and the soluble gelatin is removed by hot water after the original paper backing has been stripped off as described above. This is called the single transfer process. The double transfer process differs merely in the adoption of a second temporary support of opal glass, zinc, or paper, coated with a suitable preparation, to get a print which is not reversed.

Woodburytype and Stannotype Processes.—Many years ago, it was found that if a leaf, a bit of lace, or any similar object was placed on a sheet of soft metal, and considerable pressure applied, the impression of leaf or lace was sunk into the metal. From this metal plate, prints were taken as from an engraved plate, and the process was called Nature-Printing (q.v.). If we laid an ordinary autotype print, instead of a leaf, on a flat piece of iron, covering it at the same time with a smooth piece of sheet-lead, and then put them under sufficient pressure, the result would be an imperfect Woodburytype mold in the soft lead. The metal reverse would be faulty, because in this case the gelatin film is too thin to give enough of relief. To obtain a proper mold, a layer of sensitized gelatin, considerably thicker than that used for an autotype print, is exposed under a negative. It is developed as in the autotype process, and presents the image in considerable relief. The print is then covered with the lead, and they are pressed together in a hydraulic press, which produces a reverse or mold of the picture in the soft metal, without injuring the gelatin relief.

The production of ordinary Woodburytype prints is a purely mechanical operation, the chemical action of light not being called into play. The mold is placed in a printing-press of peculiar but simple construction, and a viscous solution of pigmented gelatin forms, so to speak, the printing-ink. This is poured on the mold, and a thin, hard, strongly sized paper placed on top of it. The lid of the press has beneath it a perfectly flat glass plate, which is now brought down on the mold,

and the lid firmly locked by a catch. The pressure causes all the superfluous gelatin to exude, while that in the mold adheres to the paper. In a short time the gelatin sets, when the plate is raised, and the print withdrawn. It has now only to be placed in a solution of alum, which renders the gelatin forming the picture insoluble.

The Stannotype (or printing from a surface of tin) has been called a simplified Woodburytype process, and is becoming much used. Woodbury, to whom it also is due, thus describes it: 'A positive is first made from the negative—preferably by the carbon process. From this carbon or other transparency a negative is made also in carbon; but in this case the tissue possesses much more body and much less color, so as to obtain a certain amount of relief. This (gelatin) relief negative is then coated with a thin India-rubber varnish. A piece of tinfoil is laid over it, and the whole passed through a pair of India-rubber rollers—a species of mangle, in fact. We have now a printing mold ready for placing in the press and printing from in gelatinous ink.'

Heliotype and Phototype Processes.—Both of these are photo-mechanical methods, in which the gelatin picture is itself used to print from in some form of printing-press, instead of being covered with tinfoil, as in the stannotype process. Lithographic ink is used. The film or layer of gelatin forming the printing surface requires to be specially and carefully prepared.

Photographic Enamels on Glass and Porcelain: Powder Process.—By what is called the powder process, prints are produced on paper in plumbago. It has been much used on the continent of Europe. A slightly sticky or 'tacky' preparation of sugar, gum, glycerine, and potassium bichromate, when exposed to light, loses its tackiness in proportion to the intensity of the light acting on it. A glass plate coated with this preparation, therefore, when exposed under a negative, will represent the picture, so to speak, by different degrees of tackiness. In this state, a fine powder sprinkled over it will adhere in proportion to the stickiness of the surface. When the superfluous powder is removed, and the film coated with tough collodion, it can be detached, and, if required, put on any support, such as paper; but the soluble portion of the gum, etc., is previously removed by washing.

If some powdered metallic oxide, instead of plumbago, is dusted over the undeveloped picture, supposing it to be either on glass or on china, and heated in a suitable kiln, it will become vitrified in the same way as does an enamel color when painted on.

Cyanotype or Blue-Print Printing: Copying of Plans.—This is a simple and useful way of copying geometrical drawings. The drawing is made on tracing-cloth or tracing-paper in strong, or at least distinct, black lines, and this forms the negative. A sensitizing bath can be made of 1 ounce of citrate of iron and ammonia, 1 ounce

of red prussiate of potash (potassium ferricyanide), and 8 ounces of water. An even coating of this is applied to a sheet of paper. When dry, the tracing is placed on the top of the paper, and both are covered with a glass plate to keep them in perfect contact. Ten minutes in a very bright light will suffice for exposure. The print is then washed, when the lines of the drawing will appear white on a blue ground.

Durability of Photographic Prints.—Experience has proved that silver prints, however carefully prepared, cannot be depended on for permanency. Much vexation has frequently arisen from the fading of these; on this account they are no longer used for book-illustration. They will keep better unmounted than mounted, and they should be kept in a dry situation, as damp increases their tendency to fade. Platinotype prints are believed to be permanent by those best able to judge; yet this is not altogether certain. Autotype, Woodburytype, and other prints in pigment gelatin are presumably permanent, and of course those obtained by any of the photo-mechanical processes are certainly so when printed, as they usually are, in lithographic or printers' ink.

Photolithography and Zincography.—The only difference between these is that a lithographic stone is used in the first case and a plate of zinc in the other for the mechanical printing. By what is called the transfer process, this art is now largely practiced. It is necessary that the original drawings should be done in lines, and not in half-tint. A negative is taken from the drawing by the camera, and from it a print is made on paper coated with bichromatized gelatin much in the same way as in the autotype process. But before the print is developed, it receives a coating of lithographic transfer ink prepared specially for the purpose. It is next floated in warm water till the lines are seen as depressions. With the aid of a sponge and water at temperature about 150° F., the soluble portion is removed, leaving the picture in insoluble gelatin, with its coating of transfer ink. It then requires only to be washed, dried, and transferred to the stone or zinc plate (see LITHOGRAPHY).

Photo-Reliefs.—This term is applied to a picture in relief on metal, which can be used like a wood-cut in the ordinary printing-press. The image from an inked 'transfer' of the same kind as that used in photolithography is transferred to zinc so as to form a resistant to an etching fluid. Finely powdered rosin is added to the layer of ink, to make a still better protecting surface. Weak acid is then applied, which so far etches the picture. Dilute sulphate of copper is next flooded over the zinc, which produces a fine deposit of metallic copper on the bare parts of the zinc. The plate is again immersed in the acid, and voltaic action now takes place, causing the zinc to dissolve where not covered by the ink. When the action ceases, the plate is washed with water. More ink and rosin, as well as new copper solution, is applied,

and the plate again put into the acid. This operation is repeated till a sufficient depth is given to the relief. Electrotypes, which are sometimes faced with steel, are made from these zinc reliefs. This process is said to give very good results. There are a number of ways of making these relief blocks, several of which are by the use of a fatty transfer in some similar way to that above described, but without the voltaic action.

Photo-Engraving.—For reproduction of line drawings, zinc plates are mainly used. A negative giving good contrast having been made, the zinc is polished and coated with a solution of albumen, water and bichromate of ammonia, and dried slowly by heat. After printing behind the negative, the plate is covered with greasy lithographic ink, which adheres to the insoluble, or exposed, parts after washing. It is then powdered with dragon's-blood, which sticks to the remaining ink and prevents the metal from being affected in those parts when etched in dilute nitric acid. Another important branch of this art is the half-tone process, in which a negative is obtained which gives an image on the metal plate consisting of a great number of small black dots and clear spaces. The sizes of the dots and spaces vary with the tones of the original. This effect is obtained by using in front of the negative plate a glass screen having lines ruled upon it to cause alternating black lines and clear spaces. The lines are usually ruled in two directions, crossing at right angles, and having a clear space at the intersections. The metal plate, usually copper, is coated with a sensitive enamel composed of albumen, glue, bichromate of ammonia and water, which becomes insoluble in water when exposed to light. When the print has been made on the copper plate from the half-tone negative, the unexposed portions of the enamel are washed out, leaving the enamel in dots where it has been exposed. It is then heated to render the enamel insoluble in the etching fluid, and is etched in chloride of iron. The printed picture from these plates consists of a series of dots, grading from very small in the lighter portions to almost or quite solid blacks in the deepest shadows. This method is now used for book and magazine illustrations.

Photography is now much employed to transfer drawings and pictures from nature on to the wood for the wood-engraver. This process is of much importance, as the original drawing is preserved, not only for comparison with the finished engraving, but also for its artistic value. Moreover, the drawing may be made of any convenient size, and reduced on the wood—a great consideration when minute objects are to be represented. One process is as follows: The surface of the wood is prepared with a ground of water-color Chinese white, and, to harden it enough to resist the subsequent washings, the enamel of a glazed card is added. It is then coated three times: (1) with a solution of albumen, and dried; (2) with a solution of albumen and chloride of ammonium, and again dried; (3) with a mixture of 1 ounce ether,

1 ounce alcohol, 8 grains gun-cotton, and 30 grains nitrate of silver. On this surface the subject is printed from the negative, after which the collodion is dissolved off by alcohol and ether. The image is fixed with hyposulphite of soda, and when washed and dried is ready for the engraver, who now engraves the block in the usual way.

Photomicrography consists in enlargement of microscopic objects, by means of the microscope, and projection of the enlarged image on a sensitized plate. The principle on which the enlargement is effected is that of the conjugate foci, exactly the same as in ordinary photography. This branch of microscopic and photographic science has proved a useful aid in the sciences of Botany, Physiology, and Entomology.

Microphotography.—By reversing the arrangement necessary for enlargement of microscopic objects, minute photographs of engravings, or other objects, may be produced, which would require a microscope for their inspection. In this way, communication was maintained during the investment of Paris, when minute photographic copies of letters and newspapers were inserted in quills, and fastened to carrier pigeons.

Celestial Photography comprehends the application of photography to automatic registration of astronomical phenomena. The laborers in this field of scientific research have been numerous in the United States and Europe. It is not going too far to say that photographic astronomy largely displaces direct observation and may fairly be termed the astronomy of the future. An interesting item in these researches is the demonstration of the sphericity of the moon by means of the stereoscope and lunar photographs; also the determination of the nature of many of the more obscure markings on its surface, by which elevations are clearly distinguished from depressions. Also the faculæ and spots on the sun's surface have been photographed, and examined stereoscopically, by which they have been found to arise from elevations of the outer regions of the photosphere. The instrument for the purpose of solar photography is called a photoheliograph. Photography has been extensively employed also in connection with solar and stellar spectroscopy; and in the hands of Lockyer in England, Draper in America, and Vogel in Germany, has rendered much service to astronomical science.

There are many applications of photography in other branches of science not here mentioned. In meteorology and in military engineering, it has been of especial use. For police purposes, it has proved of great service: every convict is now photographed, and his portrait can be widely distributed if necessity arises.

See POSITIVE PRINTING.

PHOTOGRAVURE, *fō-tō-grâv′ūr* [Gr. *phōs*, light; Fr. *gravure*, engraving]: art of producing an incised engraved plate for printing, by the action of light on a sensitized surface, often supplemented by the action of an acid. The Niepce process of P. is well adapted for the reproduction of line-engravings. In this process a copper-plate is coated with bitumen and exposed to the action of light, with a negative superposed on it. The print thus produced is brought out with olive-oil and turpentine, by which the parts acted on by the light are dissolved, while the rest of the surface is but slightly effected. Then the plate is etched. In the process invented by Fox Talbot, a gelatin print is transferred to a copper-plate to which a grain has been given by sprinkling its surface with powdered resin, which is then warmed. In etching with ferric acid, the opaque portions of the gelatin film are rendered insoluble and impermeable. Immersion of the plate in a weak solution of copper sulphate, before etching, increases the regularity of the erosion by the ferric acid. For the Woodbury process, see PHOTOGRAPHY.

PHOTOLOGY, n. *fō-tŏl′ŏ-jĭ* [Gr. *phōs* or *phōta*, light; *logos*, discourse]: the science of light, explaining its nature and phenomena; optics. PHOTOLOGIC, a. *fō′tō-lŏj′ĭk*, or PHO′TOLOG′ICAL, a. *-ĭ-kăl*, pertaining to.

PHOTO-MAGNETISM, n. *fō′tō-măg′nĕt-ĭzm* [Gr. *phōs* or *phōta*, light; and Eng. *magnetism*]: that branch of science which describes the relations of the phenomena of magnetism to those of light.

PHOTOMETER, n. *fō-tŏm′ĕ-tėr* [Gr. *phōs* or *phōta*, light; *metron*, a measure]: instrument for measuring the relative intensities of light. PHOTOM′ETRY, n. *-trĭ*, art of measuring the intensity of light; measurement of the intensity of the different kinds of light.—The *Photometer*, as an instrument for scientifically measuring intensity of light, seems to have been sought first by Bouguer; but his investigations were far surpassed by those of Lambert, about 1760, who indicated an exceedingly simple and effective kind of P., afterward constructed by Rumford. The instrument consists of a screen of thin paper placed vertically, and behind it, at the distance of a few inches, is placed a cylindrical stick, or any other similar body. When the intensity of light from two flames is to be compared, they are placed behind this stick in such a way that each casts a separate shadow of the stick on the paper screen. The observer stands in front of the screen, and directs the removal of the two lights either to or from the stick, till the shadows which are cast on the screen are equally obscure. The distance of each light from the shadow that it casts on the screen is then measured; and the squares of these distances give the relative intensities of the two lights. This P. may be modified by employing, instead of a cylindrical stick, a second screen parallel to the first, but of greater thickness, and having an aperture cut in

its centre. The two lights being then placed behind the second screen, and considerably apart, each casts a separate illumination through the aperture in the second upon the first screen, and the observer in front of the latter changes their relative distances till the illuminations appear to the eye of equal intensity. The calculation is the same as before. There are several other classes of photometers, which, however, do not deserve the name, as they depend on the heating and chemical powers which generally accompany light, and not upon the intensity of its action on the organs of vision. Thus, Leslie's instrument is nothing more than a differential thermometer, while Saussure's and Landriani's depend on the chemical effects of light. The chemical P. of Bunsen and Roscoe depends on the quantity of hydrochloric acid formed in a specified time from the union of its gaseous elements under the influence of light. The Bunsen P., of which a modified form is commonly used in gas-works, is independent of chemistry, and consists mainly of a screen of thin writing-paper on a frame, with a spot of grease on it. When there are lights on either side of the screen, the spot will show dark on the side toward the weaker light. When the lights are equal, the spot is of the same shade as the surrounding paper, and the intensity of the light is calculated from their varying distance from the screen, the square of the distance showing the power of the lights. In the well-known P. of Bouguer, as modified by Ritchie, the lights from the two sources in comparison are reflected so as to show side by side. The more powerful is moved away till the two reflections seem equal; then the calculation from distance is made as before. Very excellent work in celestial photometry has been done in later years; in observations at Harvard Observatory, many very delicate photometers, some of them new in principle, have been successfully employed. (See *Nature*, 1879.)

PHOTOPHOBIA, n. *fō′tō-fō′bĭ-ă* [Gr. *phōs* or *phōta*, light; *phobĕō*, I dread; *phobos*, fear]: the dread, fear, or intolerance of light.

PHOTOPHONE, *fō′tō-fōn*, or RADIOPHONE: name of a comparatively simple apparatus which may be said to achieve the feat of transmitting articulate speech to a distance along a beam of light. It was described first in 1880 by Prof. Graham Bell, known in connection with the telephone, at the Boston meeting of the Amer. Assoc. for the Advancement of Science; though in 1878 its inventor had announced the possibility of 'hearing a shadow' by means of a similar agency. The success of the P. depends on the peculiarities of the metal selenium. Crystalline selenium offers a high degree of resistance to the passage of an electric current; it is eminently sensitive to light; and the resistance is less when exposed to light than in the dark, being in some cases only a fifteenth in the light of what

it is in the dark. Founding on these peculiarities, Prof. Graham Bell, his friends and assistants, devised about 50 forms of apparatus for so varying the transmission of light to prepared selenium as to produce audible sound. In the P. found most serviceable, the transmitter is a plane mirror of silvered microscope glass or thin mica; the receiver, fixed at a distance without any connection, is a paraboiic reflecting mirror, in the focus of which is placed a sensitive selenium 'cell,' connected in local circuit with a battery and telephone. When the apparatus is used, a strong beam of light is concentrated by a lens in the plane mirror; the speaker directs his voice against the back of this mirror, which is thrown into vibrations corresponding with those of the voice. The reflected beam of light, to which similar vibrations are communicated, is directed through a lens to the receiving mirror, and creates in the selenium cell a rapidly intermittent current, which at the end of the telephone attached becomes audible again as vocal sound. When first described, the P. had been used effectively with a distance of 230 yards (more than a furlong) between transmitter and receiver. The rays of the oxyhydrogen light, or of an ordinary kerosene lamp, suffice for transmitting articulate speech. The loudest sounds obtained from the P. were produced by means of a perforated disk, noiselessly revolving so as rapidly to interrupt the light in transmission

It was also found that a very audible sound could be procured from the selenium without the aid of telephone and battery. A beam of intermittent light will produce a strong musical note from the selenium. Further experiment showed that selenium is not the only substance thus sensitive to light. Still louder sounds than these obtained from the selenium directly, though not articulate, were got from diaphragms of hard India-rubber and of antimony; and sounds of varying intensity were given out by many other substances, including gold, silver, zinc, lead, paper, parchment, and wood.

PHOTO-PROCESS, *fō′tō-prŏs′ĕs* [Gr. *phōs*, light; Eng. *process*]: any process for making plates for printing by the agency of Photography (q.v.).

PHOTOPSY, n. *fō-tŏp′sĭ*, or PHOTOP′SIA, n. *-sĭ-ă* [Gr. *phōs* or *phōta*, light; *opsis*, sight—from *opsomai*, I shall see]: a disease of the eyes in which luminous rays of light appear to play before them—a symptom of amaurosis.

PHOTO-RELIEF, n. *fō′tō-rē-lēf* [prefix *photo-*; Eng. *relief*]: photograph in which the lights and shades are represented by elevations and depressions of its surface.

PHOTO-SCULPTURE, *fō-tō-skŭlp′tūr:* ingenious application of photography to assist a sculptor in modelling portrait-statues, or fac-similes and reduced reproductions of other statues; invented 1867. The subject, in the centre of a circular chamber, is photographed simultaneously by 24 cameras, arranged at equal dis-

tances round the chamber. The twenty-four photographs are subsequently made available in the sculptor's studio, where the clay model is arranged on a frame capable of being turned round. A magic lantern throws the outline of each photograph in succession on a screen in front of the artist, who by means of a pantograph brings each outline to bear on the clay. At each time, the model is turned round 1-24 of a revolution.

PHOTOSPHERE, n. *fō'tō-sfēr* [Gr. *phōs* or *phōta*, light; *sphaira*, a sphere]: a sphere of light; the luminous spherical envelope of the sun.

PHOTOTHERAPY: the treatment of disease by light—sunlight and electric light. (For treatment by the Roentgen ray or X-ray, see RADIOTHERAPY.)

From the very earliest times sunlight has been considered an important aid in the preservation of health. The ancient Greeks and Romans exposed their naked bodies to the sun in the open air to recruit mental and physical energies, and built balconies or terraces *(solaria)* on the roofs of southern walls of their dwellings, so that the occupants could sun themselves. Exposure to the sun's rays was also adopted by the physicians of those times as a remedy for many affections, 'especially dropsy, inflammation of the kidneys, and paralysis.' Celsus, the Latin writer, recommended for those with weak digestion a house 'well lighted, having the winter sun'; but while he and Galen advocated sunlight as a remedial agent they pointed out the evils resulting from excessive insolation. Much has been written within the last century on the remedial value of sunlight. In 1815 Cauvin presented a thesis 'on the benefits of insolation'; prior to 1820 Ebernier, Girard and others discussed the effects of sunlight on animal life; and in 1847 Richter, at Göttingen, wrote on 'insolation, or the power of the sun on the human body.' In 1848 Perreira spoke of solar light as a 'vivifying and vital stimulus,' adding: 'In maladies characterized by imperfect nutrition and sanguinification, as scrofula, rickets and anemia, and in weakly subjects with œdematous limbs, free exposure to solar light is sometimes attended with the happiest results.'

The importance of light for healthy growth and development has been recognized by sanitarians for many years. Solaria or sun-rooms are a part of some modern hospitals. Houses and rooms receiving little or no sunlight are unhealthful. Animals and plants living in the dark become bleached, as is celery. Clinical observations show that a want of sunlight produces depression of spirit, lack of energy, loss of appetite, disturbance of digestion, turbid urine, and a kind of homesickness. The face becomes pale (etiolation), the blood is thin, the red corpuscles are diminished, pulse is frequent and weak, palpitations of the heart occur on the slightest exertion, there is muscular debility, little recuperative power, and an increased susceptibility to contagious diseases.

PHOTOTHERAPY.

Interesting experiments and observations have been made as to light, by Becklard, Becquerel, Draper, Edwards, Gardner, Hunt, Landgrebe, Hammond and others; but, as one of the writers observes, 'we do not know what is the exact effect produced by light. Does it,' he inquires, 'act directly, or is its only effect to modify the intensity of certain functions such as respiration?' Later Edward Smith proved that light is a powerful stimulus to respiration, that 'under the influence of daylight one-third more atmospheric air enters the lungs than under the darkness or even under exposure to artificial light.' Hence the vigor of the 'ruddy, healthy peasant who retires to rest with his cattle and is up with the lark' is believed to be mainly due to the thorough oxygenation and subsequent reddening of the blood by much contact with oxygen in the light and air of the day. Where direct sunlight cannot be obtained in rooms, reflected sunlight by means of mirrors has been found serviceable, in the maintenance of health. A room with a southern exposure is desirable. Sternberg and others have shown that bright sunlight, independently of the heat of the sun, is germicidal, destroying various pathogenic organisms, sometimes within a single hour. Sunlight is thus an important disinfectant. The sterilizing influence of light in the purification of water and sewage has been repeatedly proved. But the fact that the germicidal property of light chiefly depends on its blue and violet rays was proved by Finsen near the close of the 19th century. It has been recently stated that the strongest sunlight has too feeble bactericidal properties for therapeutic purposes; for example, it does not kill bacterial skin-disease in the summer; but a concentrated focused light, transmitting as many blue, violet, and ultra-violet rays as possible, such as the concentrated electric light of Finsen is necessary. This light kills bacteria in a few seconds when spread on a thin film of agar. But Angell in 1878 had reported cases of acne speedily cured 'by exposure to direct and entire sunlight.'

Light has long been considered a complex agent. It has been known that the sunbeam is resolvable into rays of various colors (violet, indigo, blue, yellow, green, orange, red), which embody luminosity, heat and actinism, the chemical property of light. It was known that the red rays of the spectroscope were heat-rays; that the rays toward the violet side were actinic or chemical; that luminosity was strongest in the orange and yellow rays. Later it was discovered that there are invisible heat-rays beyond the red, and actinic rays beyond the violet, and these were called ultra-violet. About 1845 Gardner and R. Hunt experimented with the rays separated by a prism, and ascertained some interesting facts as to the effects of blue, yellow and violet rays upon vegetation. Ponza, an Italian physician found blue and violet light to be soothing to the insane. Gen. Alfred Pleasanton, in

his advocacy of blue light as an invigorator, claimed too much for it, and the 'blue-glass' craze died out. Most physicians believed that the treatment by isolated rays of light did not possess 'very essential therapeutic value.' A few clung to the idea that if the excess of heat and light could be eliminated the actinic rays might be of value.

It was reserved for Neils R. Finsen, a physician of Copenhagen, in 1895, to utilize scientifically the constituent or spectroscopic elements of light as therapeutic agents. In 1832 Pictou, of New Orleans, published a pamphlet proving that the absence of light would prevent suppuration and pitting (scarring) in smallpox, and recommended that the eruption should be protected from air and light. Finsen, by numerous experiments on worms and insects, convinced himself that under red light they were comfortable, and under blue light were irritated. Then, reading Pictou's pamphlet, he inferred and advised that keeping smallpox patients in a red light would be as efficacious as darkness in preventing pock-marks by excluding the irritating actinic rays. If the skin is protected against the chemical rays inflammation will diminish and suppuration be prevented. In August, 1893, Svendson, in Norway, and in November, 1893, Benckert, in Sweden, used the red-light treatment with smallpox patients, and found that suppuration was abolished, scars were rare and insignificant, and the disease was shortened. Even a very little daylight admitted to the room did harm, so sensitive was the inflamed skin to the actinic rays. In mild cases a clear red light was found sufficient; in severe cases a deep red light was necessary. Having proved that red light was inimical to the germs of smallpox and other eruptive diseases, Finsen turned his attention to the effect of decomposed light on other germ-diseases, especially lupus. He proved (1) that the bactericidal action of light is practically limited to the blue, violet and ultra-violet rays and is greatly intensified by concentrating the rays by means of a suitable apparatus; (2) that the actinic rays so concentrated will penetrate the skin to a small degree and will go deeper if the red blood be pressed out of it—hence they would be of value in superficial cancer, baldness of microbic origin, acne, etc.; (3) that they have power to produce an inflammation of the skin *(erythema solare)*. Finsen's first case of lupus was successfully treated in 1895, with an ordinary arc electric light and a hand-lens, the red and ultra-red rays being filtered out through blue water. He then devised and used a sun-apparatus consisting of two lenses of glass, one plain, the other convex, framed in a brass ring, mounted on a stand, and which admitted of adjustment and focusing. Between the lenses was a bright blue weak ammoniacal solution of copper sulphate. Discovering that the ultra-violet rays were more efficacious than the violet in killing bacteria, he abolished the blue-water filter which pre-

vented the ultra-violet rays from passing, and used clear distilled water, which sufficiently absorbs the red and ultra-red burning rays. Lenses of clear quartz-crystal were substituted for those of glass, it being found that they are better heat-filters, and allow the chemic rays to pass almost unimpaired. As sunlight could not be depended upon for regular and systematic treatment, Finsen turned to the electric light.

The Finsen apparatus as now constructed consists of an arc-lamp, of from 40 to 80 amperes and one or more telescopic tubes of brass for concentration and focusing. Each tube closed is 3 feet 4 inches long and can be extended 10 inches. The head-piece of the tube has two plano-convex lenses of quartz-crystal, one with the convexity toward the light, the other with the plane surface in contact with the plane surface of the first lens. Toward the lower end of the tube there is a chamber for distilled water, designated to diminish the heat-rays not eliminated by the crystal lenses. The light-rays, emerging from this bath, are concentrated by another quartz-crystal plano-convex lens at the distal end of the tube upon the surface to be treated, the convex surface of the lens being toward the patient. To enable the rays to penetrate the surface more deeply by squeezing out the blood a compressor may be used, consisting of two quartz-crystal lenses, one plane, the other convex, with a chamber between having an inlet and outlet, through which water can be kept continuously flowing still further to cool the rays. This compressor is either held in place by an attendant or tied on. An improvement by Hopkins, of Brooklyn, admits of the adjustment of the tube on a stand to suit the case to be treated, as in uterine carcinoma.

The objections to the Finsen apparatus are the cost, the usually frequent and tedious treatment necessary—one hour a day for months—and the effects sometimes produced on the eyes. It has mainly been used in cases of *lupus vulgaris*, and *lupus erythematosa*, birth-marks, acne and rodent ulcer.

Though Finsen's discovery may not do all that has been claimed for it, it marks a great advance, especially in the cure of lupus. Out of 456 cases treated by Finsen, 130 were cured; the disorder had not recurred in from one to five years. Cases of abdominal malignant cancer have been successfully treated in this country. It is claimed by originators of improved apparatus that as much can be done therewith for lupus in 20 minutes as Finsen effected in an hour or more, that only 30 amperes, instead of 80 are necessary, and that one application in several days is sufficient.

The Minim light, suggested by Minim, of Saint Petersburg, which is an ordinary incandescent light, covered by a bulb of natural blue glass with a reflector, has proved valuable in the treatment of various forms of ulcers, in *alopecia areata*, in contusions, and in other acute injuries.

Minim also offers this light as a substitute for the Finsen light in lupus.

Dr. Hopkins, of Brooklyn, claims the treatment by the light of the Hopkins lamp is a cure for pulmonary tuberculosis in the first stage, as well as for many cases in the second stage, and that it has been of great comfort and has prolonged life in a number of instances in the third stage of the disease. The lamp consists of a 50-ampere searchlight in a brass cylinder, with a French condensing-lens, 18 inches in diameter. It focuses at a distance of about 12 feet. The light passes through a sectional screen of blue glass, two feet square, to cut out the heat-rays, and impinges upon the chest of the patient. Half-hour exposures to this light are found to be sufficient.

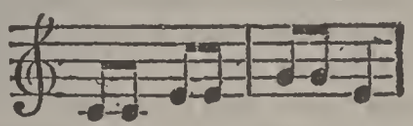
The German Light-Bath is used for treating the naked body by concentrated light. It consists of a couch in a cabinet, or sheet enclosure, with two or more lamps within it comprising from 40 to 80 amperes. This bath of light has proved efficacious in malnutrition, marasmus, and various forms of debility, and in neurasthenia and other neurotic affections.

PHOTOTYPE, n. *fō'tō-tīp* [Gr. *phōs* or *phōta*, light; *tupos*, an impression, a type—from *tuptō*, I strike]: a type or plate resembling an engraved plate, produced from a photographic picture by a peculiar process, and capable of being printed from; the process by which such a plate is produced.

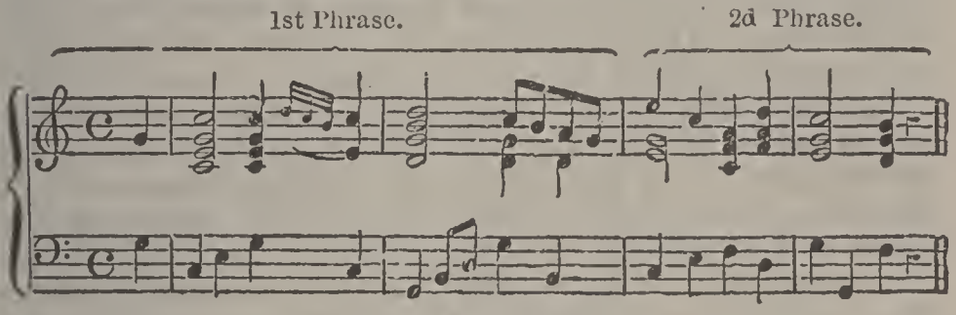
PHRAGMA, n. *frăg'mă*, PHRAG'MATA, n. plu. *-mă-tâ* [Gr. *phragma*, a hedge or fence]: a transverse division or false partition in fruits; a spurious dissepiment.

PHRASE, n. *frāz* [L. and Gr. *phrasis*, speech, language —from *phrazō*, I say: It. *frase:* F. *phrase*]: a short sentence or expression; two or more words containing a particular mode of speech; an idiom; style or manner in writing or speaking: in *mus.*, any regular, symmetrical course of notes which begin and complete the intended expression (see below): V. to express in peculiar words; to style. PHRAS'AL, a. *-al*, pertaining to or of the nature of a phase; consisting of a phrase. PHRA'SING, imp.: ADJ. employing peculiar expressions. PHRASED, pp. *frāzd*. PHRASE-BOOK, a book containing or explaining phrases. PHRASEOGRAM, n. *frā'zē-ō-grăm*, combination of shorthand characters to represent a phrase or sentence. PHRASEOGRAPH, n. *frā'zē-ōgrăf* [Gr. *graphō, I write*]: the words that compose a phrase. PHRA'SEOG'RAPHY, n. *-ŏg'ră-fĭ*, the method of writing two or more words without lifting the pen. PHRA'SEOL'OGY, n. *-ŏl'ŏ-jĭ* [Gr. *logos*, discourse]: the peculiarities or style in the diction of a writer; style or manner of expression. PHRA'SEO-LOG'ICAL, a. *-lŏj-ĭ-kal*, or PHRA'SEOLOG'IC, a. *-ĭk*, peculiar in expression; consisting in a peculiar form of words; idiomatic. PHRA'SEOLOG'ICALLY, ad. *-lī*.—SYN. of 'phrase, n.': clause; sentence; expression; proposition; period; paragraph; form; diction; style.

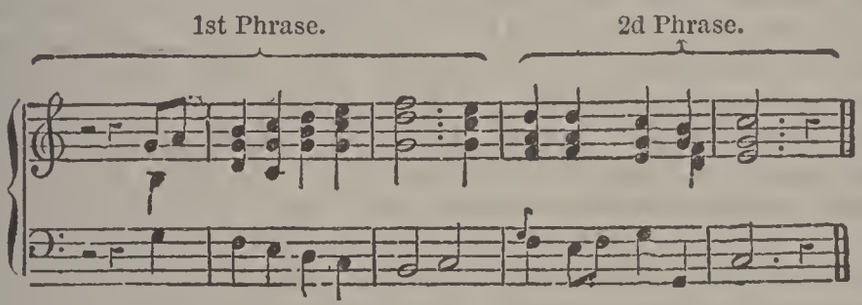
PHRASE, *frāz*, in Music: the course of simple motives containing in themselves no satisfactory musical idea, which enter into the composition of every melody containing a perfect musical idea—e.g.:



The P. consists usually of two measures; in compound time, it may be comprised in one measure, and an extended P. is one which contains three measures. In the more simple and regular forms of musical composition, two phrases unite to form a section ending in a cadence; and a perfect musical idea is formed of two such sections terminating, the first with the dominant, the second with the tonic harmony.



Dominant Section.



Tonic Section.

A little confusion has arisen from the use, by some musical writers, of the word P. for what is here called a section.

PHREN-, *frĕn-* [Gr. *phrēn* or *phrĕna*, the mind—*phrēn* means the 'diaphragm or mind,' the ancients believing the *mind* to be situated in the *diaphragm*]: as the first element of a compound, *phren* has two meanings—1, 'mind,' and thence 'brain,' as in phrenetic, phrenology; 2, 'diaphragm,' as in phrenic.

PHRENETIC, a. *frĕ-nĕt'ĭk* [Gr. *phrēn*, the mind]: liable to violent sallies of mental excitement or disorder; having an affection of the brain: N. a person occasionally wild and erratic. PHRENET'ICALLY, ad. *-ĭ-kăl-lĭ*.

PHRENIC, a. *frĕn'ĭk* [Gr. *phrēn*, the diaphragm, the mind]: pertaining to the diaphragm. PHRENITIS, n. *frĕ-nī'tĭs*, inflammation of the brain or its membranes; delirium: see MENINGITIS.

PHRENOLOGY.

PHRENOLOGY, n. *frĕ-nŏl'ŏ-jĭ* [Gr. *phrēn*, the mind, *phrĕnos*, of the mind; *logos*, discourse]: the science which teaches that the nature and character of the faculties of the human mind may be ascertained from the development of the different parts of the brain, as exhibited in the external form of the upper part of the skull. PHRENOLOGICAL, a. *frĕn'ō-lŏj'ĭ-kăl*, pertaining to or according to phrenology. PHREN'OLOG'ICALLY, ad. *-lĭ*. PHRENOLOGIST, n. *frĕ-nŏl'ō-jĭst*, one versed in phrenology.—*Phrenology*, as a science, teaches that there exists a relation between the several faculties of the mind and particular regions of the brain, and that these are the organs of those faculties; in accordance with this theory phrenologists chart the cranium of man in sections, each section being taken to represent the seat in the brain of some definite faculty or mental or moral disposition. That the brain as a whole is the organ of mind we should incline to regard as an instinctive judgment were it not that some of the most highly gifted races, as the Hebrews, the Egyptians, nay even the Hellenes, as is proved by their vocabularies and their literature, recognized various organs and viscera as the seats of the intellective and of the emotional faculties; the heart, for example, was for the primitive Romans the seat of understanding, of wisdom, as also for the Egyptians, the Hebrews, the Greeks; but at the same time it was for them the organ of feeling and emotion. But Pythagoras (6th century B.C.) held the brain to be the seat and organ of understanding; yet Aristotle, 200 years later, taught that the heart is the master organ of life and intelligence, and that the brain is a cold, inert, bloodless organ, the sole function of which is to temper the heart's excessive heat. But for Plato the heart was the chief organ of intellect, and the great naturalists, anatomists, and physicians who lived later adhered to Pythagoras' view despite the very high authority of the Stagirite. Even in the Middle Ages when Aristotle's authority was supreme, the scholastic philosophers rejected his doctrine on this point, and Albertus Magnus in the 13th century and very many other philosophers and naturalists after him divined a localization of faculties in the brain; Albertus saw in the anterior region the seat of judgment or ratiocination, in the medial, that of imagination, and in the posterior region the seat of the memory; and his successors in a similar way distributed the seats of the several faculties of the soul in the different regions of the brain. Hence, Francis Joseph Gall, though justly accounted the founder of modern phrenology, did but revive the ancient knowledge and develop it further. He expounded his views on the subject in lectures at Vienna in 1796 and later, but in 1802 was compelled to discontinue them by order of the Austrian government prompted by the ecclesiastical authorities. Gall had already attached to himself a gifted pupil and efficient coadjutor in the

person of John Gaspar Spurzheim, and the pair pursued their investigations in concert and delivered lectures on phrenology throughout France and Great Britain. In both countries they gained enthusiastic disciples not only among the less educated class but among the learned also—such men as Sir George Mackenzie, Archbishop Whately, Laycock, Macnish, Andrew Combe: the last named was universally recognized as the ablest expositor of the doctrine in Great Britain, and its indefatigable propagandist. Phrenological societies sprang up everywhere in England and the United States, and the principles of the science were propounded and defended in a number of periodicals, British and American, the first both in point of time and in authority being the British *Phrenological Journal*, published in Edinburgh and edited by Dr. Combe till his death in the United States, 1847. The popular interest in phrenology which for 30 years or more was at fever heat languished and died away till now phrenological societies are heard of no more and phrenology has now but one representative in the periodical press of the United States.

Phrenology, as finally developed, is the work rather of Spurzheim and of Combe than of its first founder, Gall. Gall located 27 special faculties out of the 35 usually recognized; but to Spurzheim is due the credit of having systematized and justified Gall's data and of having enriched the science with important discoveries. Not the least of Dr. Spurzheim's merits is the improvement made by him in the nomenclature of the science: for example, when what in Gall's scheme is called *murder*, Spurzheim calls *destructiveness*, a term which is more comprehensive as well as more exact; or when of Gall's two terms *veneration* and *religion* Spurzheim retains only the first, in which the second is comprised. The 27 faculties identified by Gall are by Gall himself named and numbered as follows: 1, veneration; 2, love of offspring; 3, friendship; 4, courage, self-defense; 5 murder; 6, cunning; 7, the sentiment of property; 8, pride, self-esteem, haughtiness; 9, vanity, ambition; 10, cautiousness; 11, memory of things, educability; 12, local memory; 13, the memory for persons; 14, memory for words; 15 memory for languages; 16, colors; 17, music; 18, number; 19, aptitude for mechanic arts; 20, aptitude for drawing conclusions; 22, wit; 23, poetry; 24, good nature; 25, mimicry; 26, religion; 27, firmness of character. (The numerical figures do not apply to Spurzheim's phrenological chart.)

Spurzheim classified these faculties, propensities and other characters as follows:

SPURZHEIM'S CLASSIFICATION AND LOCALIZATIONS.

Spurzheim recognizes two great classes of human faculties, namely:

I. Feelings, divided into:

1. Propensities, or predispositions only to certain kinds of acts.

2. Sentiments, or impulses which prompt to emotion as well as to action, and these are either
a, Lower, common to man and lower animals; or
b, Higher, peculiar to man.

II. Intellective faculties:
1. Perceptive faculties.
2. Reflective faculties.

PROPENSITIES.

1. Amativeness. 2. Philoprogenitiveness. 3. Concentrativeness. 4. Adhesiveness. 5. Combativeness. 6. Destructiveness. 6*a*. Alimentiveness.. 7. Secretiveness. 8. Acquisitiveness. 9. Constructiveness.

SENTIMENTS: LOWER.

10. Self-esteem. 11. Love of Approbation. 12. Cautiousness.

SENTIMENTS: HIGHER.

13. Benevolence. 14. Veneration. 15. Conscientiousness. 16. Firmness. 17. Hopefulness. 18. Wonder. 19. Ideality. 20. Wit. 21. Imitation.

PERCEPTIVE FACULTIES.

22. Individuality. 23. Form. 24. Size. 25. Weight. 26. Color. 27. Locality. 28. Number. 29. Order. 30. Eventuality. 31. Time. 32. Tune. 33. Language.

REFLECTIVE FACULTIES.

34. Comparison. 35. Causality.

Consult: Gall and Spurzheim, *Anatomie et Physiologie du Système Nerveux* (1810–19); Gall, *Des Dispositions Innées de l'Ame et de l'Esprit* (1812); Sewall, *An Examination of Phrenology* (1837); Fowler, *Phrenology and Physiology* (1844); *Phrenological Journal*, xxxi. 4 (1885); Donaldson, *The Growth of the Brain* (1898); Barker, *The Nervous System* (1899); Holländer, *The Mental Functions of the Brain* (1901).

Consult also Dr. Laycock's *Mind and Brain* (2 vols., Edinburgh, 1860); Comte's *Philosophie Positive*, iii. (or Miss Martineau's translation i. 466); Sir Benjamin C. Brodie's *Psychological Inquiries*, Dialogue VI. (London, 1854); Samuel Bailey's *Letters on the Philosophy of the Human Mind*, 2nd Series, Letters XV-XXI. (London, 1858); and Professor Bain *On the Study of Character, including an Estimate of Phrenology* (London, 1861). Sir William Hamilton's objections, now appended to his *Lectures on Metaphysics*, I. 404 (Edinburgh, 1859), were discussed in the *Phrenological Journal*, IV. V., and are remarked on by Combe in his work *On the Relation between Science and Religion*, pref., p. XVII. (Edinburgh, 1857).

PHRENOMAGNETISM, n. *frĕn'ō-măg'nĕt-ĭzm* [Gr. *phrēn*, the mind, and Eng. *magnetism*]: excitement of the organs of the brain by mesmeric passes or magnetic influence.

PHRENSY, n., or PHRENZY, n. *frĕn′zĭ* [L. and Gr. *phrenēsis;* F. *phrénésie* or *frénésie*, delirium, phrensy—from Gr. *phrēn*, the mind]: delirium; high mental excitement or distraction. PHRENSIED, a. *frĕn′zĭd*, affected with madness. PHREN′SIEDLY, ad. *-lĭ:* see FRENZY.

PHRYGA′NEA: see CADDICE.

PHRYGIA, *frĭj′ĭ-a:* country in Asia Minor, whose extent and boundaries varied very much at different periods of ancient history. In prehistoric ages it is believed to have comprised the greater part of the peninsula; but at the time of the Persian invasion it was limited to the districts known as Lesser P. and Greater P.—the former stretching from the Hellespont to Troas (inclusive), the latter occupying a central portion of Asia Minor. The inland boundaries of Lesser P. are not well ascertained; but Greater P. was bounded n. by Bithynia and Paphlagonia, e. by Cappadocia and Lycaonia, s. by the Taurus range, w. by the maritime countries of Mysia, Lydia, and Caria. At a later period it was considerably reduced by the formation of Galatia (q.v.) and the extension of Lycaonia. P. was in general a high and somewhat barren plateau, though its pastures supported immense flocks of sheep, noted for fineness of their wool, as indeed they still are. The most fertile part was the valley of the Sangarius; but the most beautiful and populous district was the s.w., at the base of the Taurus, where the Mæander and other streams had their rise. The mountains and streams yielded gold; Phrygian marble was anciently famous, and the cultivation of the vine appears to have been extensive.

The origin of the Phrygians is one of the mysteries of ancient ethnology. Some think that they were settled at a very remote period in Europe, and that they emigrated from Thrace into Asia Minor; and Xanthus, Herodotus, and Strabo certainly speak of such a migration. Xanthus places it after the Trojan war; but if there be any truth in the tradition at all, it can refer only to a return of some tribes to the cradle of the race in the valley of the Sangarius, for the Phrygians were regarded as one of the oldest races (if not the very oldest) in Asia Minor. Instead of seeking their origin in Thrace, the best classical ethnologists seek it in the neighboring highlands of Armenia, whence the Phrygians are believed to have spread, at a period long before the dawn of authentic history, over the greater part of the Peninsula, and thence to have crossed into Europe, and occupied the greater part of Thrace, Macedonia, and Illyria; while the mythic Pelops, who colonized the Peloponnesus, and gave it his name, was said by tradition to be a Phrygian. In both Greek and Latin poetry the Trojans are called also Phrygians; and the same name is applied to other nations of Asia Minor, e.g., the Mydonians and Mysians. In Thrace, too, many of the names of places were the same as in Troas; and it has now been demonstrated that the Armenian, Phrygian, and Greek languages are akin, so that the peoples speaking the former two, like

those speaking the latter, belong to the great Aryan branch of the human family. The Phrygians began to decline in power and numbers after the Trojan war. They were—if we can make anything like historic fact out of the mythic narratives of that early time—pushed out of Europe by the Illyrians in the n. and the Macedonians in the s., while in Asia Minor the rise of the Semitic Assyrians also depressed and weakened them, by breaking up the integrity of their territory. The whole of the s. coast of the peninsula was occupied by Semitic invaders; the Lydians and Cappadocians were of Syro-Phœnician origin; and Strabo speaks of structures of Semiramis as far n. as Pontus. Their language, manners, and religion even, underwent radical changes—hence the great difficulty in ascertaining their original characteristics. After being subjugated by Crœsus, they passed, at the dissolution of the Lydian monarchy, under the sway of Cyrus; and only from this date are they brought within the pale of positive history. Their country formed part of the empire of Alexander, and subsequently belonged to the Syrian Seleucidæ, to the kings of Pergamum, and to the Romans, who obtained possession of it B.C. 133.

The Phrygians had not a warlike reputation among the ancients; but though in later times commonly described as indolent and stupid, yet, like negroes, they were of a mystic and excitable disposition. Their religious orgies, accompanied by wild music and dancing, are frequently mentioned by classic writers, and appear to have exercised a very material influence on Hellenic worship. Cybele, 'the great mother of the gods,' was the chief Phrygian divinity; others were Sabazius (Dionysus), Olympus, Hyagnis, Lityerses, and Marsyas.

PHRYGIAN, a. *frĭj'ĭ-ăn:* pertaining to *Phrygia*, in Asia Minor; applied to a wild and stirring kind of music produced by the ancients from the flute: N. a certain light spongy stone. PHRYGIAN CAP, pointed cap with the point turned over toward the front; an anc. form of headpiece considered by the Greeks as oriental because in vogue in Asia Minor: the modern cap of liberty is of this form.

PHRYNE, *frī'nē:* famous Greek courtesan: in the time of Alexander the Great, B.C. 4th c.; b. Thespiæ in Bœotia; daughter of Epicles. She seems to have lived in Athens. Her position in life was originally very humble, and she is said to have earned a livelihood by gathering capers; but as the fame of her marvellous beauty spread, she obtained numerous lovers, who lavished gifts on her so profusely that she became enormously rich. In proof of this, the story goes that she offered to rebuild the walls of Thebes, if the citizens would allow her to place this inscription on them: 'Alexander destroyed them; Phryne, the courtesan, rebuilt them.' The Thebans declined the proposal. Her enemies accused her of profaning the Eleusinian mysteries. Summoned before the

tribunal of the Heliasts, she was defended by the rhetorician Hyperides, one of her lovers, who, perceiving that his eloquence was failing to convince the judges, threw back her veil, and displayed her naked shoulders and bosom. She was immediately acquitted, and carried in triumph to the Temple of Venus. The famous picture of Apelles (q.v.)—the 'Venus Anadyomene'—is said to have been a representation of P. Praxiteles, also one of her lovers, employed her as a model for his 'Cnidian Venus.'

PHTHAL'IC ACID, or NAPHTHAL'IC ACID: see NAPHTHALINE GROUP.

PHTHIRIASIS, n. *thĭ-rī'ă-sĭs* [Gr. *phtheiriāsis*—from *phtheir*, a louse]: a diseased condition in which lice are bred in and infest the body; cutaneous vermination.

PHTHISIS, n. *thī'sĭs* [Gr. *phthisis*, a wasting—from *phthiō*, I consume or waste away]: pulmonary consumption, a disease produced by tubercles in the lungs; called also 'pulmonary phthisis' (see CONSUMPTION). PHTHISIC, n. *tĭz'ĭk*, a wasting away; a person affected with phthisis; a slight tickling cough. PHTHIS'ICAL, a. *-ĭ-kăl*, belonging to phthisis; consumptive.

PHULOWDI, *fô-low'dē:* town of India, in the Rajpoot state of Joudpore, lat. 27° 8′ n. Pop. 15,000.

PHULWARA TREE: see BASSIA.

PHYCOCHROME, n. *fī'kō-krōm* [Gr. *phukos*, sea-weed; *chrōma*, color]: the coloring matter in lichens and in the lower Algæ.

PHYCOCYANIN, n. *fī'kō-sī'ăn-ĭn*, or PHY'COCY'ANINE, n. *-ĭn* [Gr. *phukos*, sea-weed; *kuanos*, blue]: in *bot.*, the bluish coloring matter of Nostoc and other low Algæ.

PHYCOERYTHRIN, n. *fī'kō-ĕr'ĭth-rĭn*, or PHY'COER'YTHRINE, n. *-rĭn* [Gr. *phukos*, sea-weed; *er'uthros*, red]: in *bot.*, the red coloring matter, soluble in water, found in *Floridĕæ*.

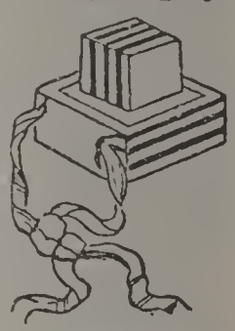
PHYCOGRAPHY, n. *fī-kŏg'ra-fĭ* [Gr. *phukos*, sea-weed; *graphē*, a drawing, a delineation]: delineation or description of sea-weeds.

PHYCOLOGY, n. *fī-kŏl'ŏ-jĭ* [Gr. *phukos*, sea-weed; *logos*, discourse]: the study of Algæ or sea-weeds: see ALGÆ.

PHYCOMATER, n. *fī'kō-mā'tėr* [Gr. *phukos*, sea-weed; Gr. *mētēr;* L. *mātĕr*, a mother]: in *bot.*, the gelatinous matter investing the sporules of certain Algæ, and in which they vegetate.

PHYCOXANTHIN, n. *fī'kō-zănth'ĭn*, or PHY'CO'XANTHINE, n. *-ĭn* [Gr. *phukos*, sea-weed; *xanthos*, yellow]: in *bot.*, the same as 'diatomine'—which see under DIATOMACEÆ.

PHYLACTERY, n. *fī-lăk′tĕr-ĭ* [Gr. *phulaktē′rĭŏn*, a guard, an amulet—from *phulax*, a guard; *phulassō*, I watch]: among the *Jews*, a strip of parchment on which were written texts from the law, worn by devout persons on the forehead, arms, or breast, particularly by the Pharisees: in the early Christian Chh., a case for containing the relics of the dead. PHYLAC′TERED, a. *-tĕrd*, wearing phylacteries. PHYLACTERIC, a. *fĭl′ăk-tĕr′ĭk*, or PHYL′ACTER′ICAL, a. *-ĭ-kăl*, pertaining to phylacteries.—*Phylacteries* were inscribed with certain passages from the Scripture (Ex. xiii. 1–10, 11–16; Deut. vi. 4–9, xi. 13–21), inclosed in small cases, and fastened to the forehead and the left arm (*Tefillin*)—also, in another form, to door-posts (*Mesusah*).—The use was in imagined accordance with Ex. xiii. 9–16, etc. The writing of phylacteries was in the hands of privileged scribes (*Soferim*) only, and many and scrupulous are the ordinances to be followed in this task. Only vellum of superior kind is to be used; the characters must be traced with the greatest care; no erasures or corrections are allowed; the lines and letters must be of equal length; etc. The case in which they are inclosed consists of several layers of calf-skin or parchment. Not the wearing, but the exaggerated form of the phylacteries worn by some of the Pharisees, is inveighed against by Christ.



Phylactery.

PHYLACTOLÆMATA, n. plu. *fĭl-ăk′tō-lē′mă-tă* [Gr. *phulak′tĭkos*, having the power to guard—from *phulassō*, I guard; *laimos*, the throat]: the division of the Polyzoa in which the mouth is provided with the arched valvular process, called the 'epistome.'

PHYLE, n. *fī′lē* [Gr. *phulē*]: a tribe; one of the divisions of the anc. Athenians: at first they were four, afterward ten.

PHYLETIC, a. *fī-lĕt′ĭk* [Gr. *phuletikos*—from *phuletēs*, one of the same tribe; *phulē*, a tribe]: pertaining or relating to a tribe or race, especially of animals.

PHYLLA, n. plu. *fĭl′lă* [Gr. *phullon*, a leaf]: in *bot.*, the verticillate leaves which form the calyx or external envelope of the flower. PHYL′LARIES, n. plu. *-lă-rĭz*, the leaflets forming the involucre of composite flowers.

PHYLLIREA, n. *fĭl-lĭr′ē-ă* [Gr. *phillur′ĕă*, a certain tree or shrub like the privet, more correctly written *philurea*]: a genus of evergreen plants, very leafy, and of a dark-green foliage, ord. *Olĕācĕæ*.

PHYLLOCYSTS, n. plu. *fĭl′lō-sĭsts* [Gr. *phullon*, a leaf; *kustis*, a cyst—from *kuō*, I hold]: the cavities in the interior of the hydrophyllia of certain oceanic Hydrozoa

PHYLLODIUM, n. *fĭl-lō′dĭ-ŭm*, PHYLLO′DE, n. *-lō′dē* [Gr. *phullon*, a leaf; *eidos*, appearance]: in *bot.*, a leaf-stalk developed into a flattened expansion like a leaf. PHYLLODY, n. *fĭl′lŏ-dĭ*, the change of an organ into true leaves; the substitution of true leaves for some other organ. PHYLLOID, a. *fĭl′loyd*, like a leaf. PHYLLOIDS, n. plu. *fĭl′loydz*, leaf-like appendages to the stems of Algæ.

PHYLLOGEN, n. *fĭl′lō-jĕn* [Gr. *phullon*, a leaf; *gennaō*, I produce]: in *bot.*, the single terminal and central bud from which leaves are produced in palms and many herbaceous plants; also called a 'phyllophore.'

PHYLLOGRAPSUS, n. *fĭl′lō-grăp′sŭs* [Gr. *phullon*, a leaf; *graphō*, I write]: in *geol.*, a beautiful genus of graptolites from the Skiddaw rocks.

PHYLLOMANIA, n. *fĭl′lō-mā′nĭ-ă* [Gr. *phullon*, a leaf; *mania*, madness]: in *bot.*, an abnormal or unusual development of leaf-tissue.

PHYLLOME, n. *fĭl-lōm′* [Gr. *phullon*, a leaf]: in *bot.*, a leaf-structure; a structure morphologically equivalent to a leaf.

PHYLLOMORPHY, n. *fĭl′lō-mŏr′fĭ* [Gr. *phullon*, a leaf; *morphē*, form, shape]: in *bot.*, the substitution of leaves for other organs; same sense as 'phyllody.' PHYL′LOMOR′PHOSIS, n. *-mŏr′fŏ-sĭs*, the study of the succession and variation of leaves during different seasons.

PHYLLOPHAGOUS, a. *fĭl-lŏf′ă-gŭs* [Gr. *phullon*, a leaf; *phagein*, to eat]: leaf-eating.

PHYLLOPHORE, n. *fĭl′lō-fōr* [Gr. *phullon*, a leaf; *phorĕō*, I bear]: the terminal bud or growing point in palms; same sense as 'phyllogen.' PHYLLOPHOROUS, a. *fĭl-lŏf′ŏ-rŭs*, bearing or producing leaves.

PHYLLOPHYTES, n. plu. *fĭl′lō-fīts* [Gr. *phullon*, a leaf; *phuton*, a plant]: plants of any kind in which leaves can be observed.

PHYLLOPODA, n. plu. *fĭl-lŏp′ŏ-dă*, PHYLLOPOD, n. sing. *fĭl′lŏ-pŏd* [Gr. *phullon*, a leaf; *podes*, feet]: an order of Crustaceæ having leaf-like feet. PHYLLOPODES, n. plu. *fĭl-lŏp′ŏ-dēz*, in *bot.*, dead leaves in Isoetes.

PHYLLOPTOSIS, n. *fĭl′lŏp-tō′sĭs* [Gr. *phullon*, a leaf; *ptōsis*, a falling]: in *bot.*, the fall of the leaf.

PHYLLOSO′MA: spurious genus or family of crustaceans: see GLASS-CRABS.

PHYLLOSTOMIDÆ, *fĭl-lŏs-tŏm′ĭ-dē:* the family of Leaf-nosed Bats, order *Chiroptera*. There are about 63 species, all natives of S. America. The largest one is sometimes called the Vampire, but has no habit of sucking blood, the true vampires being small species of other genera. The curious nose appendage is probably an organ of touch. See BAT.

PHYLLOTAXIS, n. *fĭl′lō-tăks′ĭs*, or PHYL′LOTAX′Y, n. *-tăks′ĭ* [Gr. *phullon*, a leaf; *taxis*, order; *tassō*, I arrange]: the arrangement of the leaves on the axis or stem. PHYL′LOTAC′TIC a. *-tăk′tĭk*, of or pertaining to.

PHYLLOXERA, n. *fĭl′lŏks-ē′ră* [Gr. *phullon*, a leaf; *xēros*, dry, parched]: genus of insects of order *Hemiptera*, sub-order *Homoptera*, type of a family, *Phylloxeridæ*, allied to the *Aphis* (q.v.) and *Coccus* (q.v.) families. The *Phylloxeridæ* attach themselves to various plants, on the juice of which they feed, and which they often injure or destroy. *P. vastatrix*, of this family, since 1865 has committed great devastation in the vineyards of France: it seems to have been brought from N. America. Great numbers of this insect appear on the roots of the vine, and their puncturings are so numerous and incessant, that the roots can no longer supply nutriment to the plant, which accordingly fades and dies. The *P. vastatrix* has been observed also on the leaves of the vine. It measures, when fully grown, only about $\frac{1}{33}$ of an inch in length. It is provided with a long, slender proboscis, which lies in a groove in its under side. Yellow in summer, it becomes brown at the end of autumn. Another variety, the OAK P. (*P. quercus*), appears on leaves of oak-trees.

PHYLLULA, n. *fĭl′lū-la* [Gr. *phullon*, a leaf; *oulē*, a scar, a cicatrix]: in *bot.*, the scar left on a branch or twig after the fall of a leaf.

PHYLOGENY, n. *fī-lŏj′ĕ-nĭ* [Gr. *phulon*, a stock, a race —from *phuō*, I produce; *gennaō*, I generate, I produce]: the race-history of man or animals; the race-history of an animal as obtained from its development. PHYLOGENETIC, a. *fī′lō-jĕ-nĕt′ĭk*, pertaining to the race-history of an animal: see ONTOGENY.

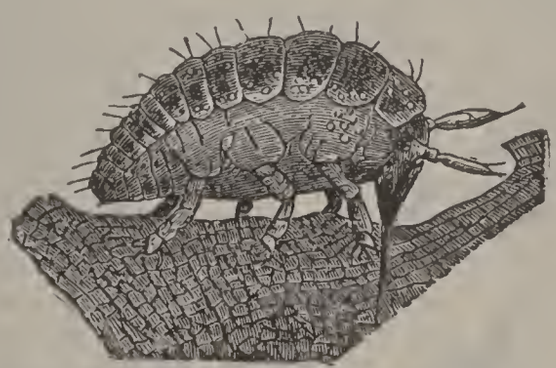
PHYMA, n. *fī′mă* [Gr. *phuma*, a tumor—from *phuo*, I produce]: a tubercle on any external part of the body.

PHYSALIA, *fī-sā′lĭ-â:* genus of *Hydrozoans*, having an oval or oblong body, which consists in great part of an air sac, so that the creature floats on the surface of the sea, with numerous appendages of various kinds hanging from its under side. The shorter of these appendages are suckers, kept in constant motion for procuring prey, and which seem also to be employed in extracting nutriment from it, as the P. has no proper mouth nor alimentary canal. Among these shorter appendages, also, some seem to serve the purpose of reproduction by germination. The longer appendages, which are extremely long—those of a P. five or six inches in length being capable of extension to 12 or 18 ft.—are rope-like tentacles, possessing a remarkable stinging power, which is probably used for benumbing prey. It is a common trick with sailors to make a novice pick up a P., the beautiful colors of which always attract admiration. The stinging power is, however, such as not

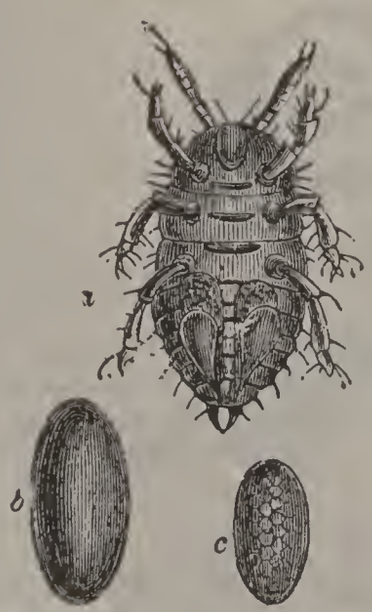
Portuguese Man-of-War (*Physalia pelagica*).

PHYLLOXERA.

Winged female Phylloxera, living on the leaves and buds of the vine, and laying parthenogenetically two kinds of eggs, one developing into a wingless female, the other into a male.



Root-inhabiting Phylloxera, showing proboscis inserted into the roc



a, Male, produced from small egg *c*, laid by winged female; *b*, large egg from which the wingless female comes.

Wingless Female.

merely to produce local pain, but constitutional irritation. It was formerly supposed that the P. has the power of expelling air from its bladder, and sinking at pleasure in the sea; but Bennett's observations (*Gatherings of a Naturalist in Australia*) render it probable that it always floats on the surface, and is driven about by the winds. The name *Portuguese Man-of-War* is often popularly given to the species of P., and particularly to *P. pelagica*. The *Physaliæ* inhabit the seas of warm latitudes, but shoals of them are occasionally driven to coasts northward.

PHYSALIS, *fī'sa-lĭs* or *fĭs'al-ĭs:* genus of plants of nat. ord. *Solanaceæ*, remarkable for the calyx, which becomes large and inflated after flowering is over, and incloses the ripened berry. The species are annual and perennial herbaceous plants and shrubs, natives of temperate and warm climates, and widely scattered over the world. The Common Winter Cherry (*P. alkekengi*) is a perennial, native of s. Europe and great part of Asia, growing in vineyards and bushy places. The red berries have a sweetish sub-acid taste; they are eaten. This and *P. Peruviana*, with yellow berries, are known as 'strawberry tomato.' The native N. Amer. species are called 'ground-cherry.' The fruit of *P. angulata* is palatable, and that of P. *viscosa* is diuretic. There are 17 United States species. The berries were formerly

Love-apple (*Physalis edulis*).

employed in medicine.—The Downy Winter Cherry, or Peruvian Gooseberry (*P. pubescens* or *P. Peruviana*), is an annual Amer. species, densely clothed with down; with heart-shaped leaves, yellow flowers, and yellowish berries, which are eatable.

PHYSALITE, n. *fĭs'ă-līt* [Gr. *phūsaō*, I blow or puff up; *lithos*, a stone]: a coarse variety of topaz occurring in large crystals, so called from its swelling up under heat.

PHYSIC, n. *fĭz'ĭk* [Gr. *phusĭkos*, conformable or agreeable to nature—from *phusis*, nature: L. *physica;* It. *fisica;* F. *physique*, natural science]: science or knowledge of medicine; art of healing diseases; profession of a physician; remedies for diseases: specially, a medicine that purges: V. to treat with medicine; to purge; to heal. PHYS'ICKING, imp. *-ĭk-ĭng*. PHYS'ICKED, pp. *-ĭkt*. PHYS'ICAL, a. *-ĭ-kăl*, pertaining to nature or natural productions; pertaining to the body or material things; perceptible to the senses; external. PHYS'ICALLY, ad. *-lĭ*. PHYSICAL EDUCATION, the training of the body to increase and preserve health. PHYSICAL GEOGRAPHY, a description of the earth in all its present relations to organic and inorganic nature (see GEOGRAPHY). PHYSICAL LAWS, the laws of nature. PHYSICAL SCIENCE, the science which treats of inorganic bodies, their external appearance, properties, etc.—distinguished from *natural science* (see PHYSICS, below). PHYSICIAN, n. *fĭ-zĭsh'ăn*, one legally qualified to prescribe remedies for external or internal use in disease, as distinguished from a surgeon; a medical man. (See PHYSICIANS, THE ROYAL COLLEGE OF: MEDICAL CODES; MEDICAL EDUCATION OF WOMEN; MEDICAL PRACTITIONER; MEDICINE, HISTORY OF.) PHYSICS, n. plu. *fĭz'ĭks*, science which treats of the properties of matter, the laws of motion, and the phenomena of nature; natural philosophy (see below). PHYS'ICIST, n. *-ĭ-sĭst*, a student of nature; one skilled in physics. PHYS'ICO-LOGIC, *-kō-*, logic illustrated by natural philosophy. PHYSICO-THEOLOGY, theology illustrated by natural philosophy.

PHYSICAL TRAINING: in some form or other is as old as mankind. Nature early taught man to knead his flesh, or bend or stretch his body, to relieve him of certain ills. And there are books as old as 3,000 years B.C. written about gymnastics, among them the *Kong-Fu* in Chinese. We also know that the Persians, Phoenicians, and Egyptians knew about gymnastics.

The Greeks were the first to make a genuine progress, however, in this branch, as in so many others.

Æsculapius, Apollo's descendant, is said to have been the inventor of the art of gymnastics.

It was 400 to 500 years before Christ that Iccus, and later, Herodicus, reduced bodily exercises to a system, and Herodicus made it a branch of medical science to preserve the health and cure diseases by the use of gymnastics, and among his pupils was the famous Hippocrates.

Diocles, Praxagoras, Herophilus, Asclepiades, Athenaus, Celsus, and Galen recommended gymnastic exercises, and gave rules for them.

Mercurialis in the 16h c. wrote a book, *De Arte Gymnastica,* or the science of bodily exercise, which he divided

into 'Gymnastics for Athletes, for the Military, and for the Cure of Diseases,' to which as used by the Greeks and Romans, he gave especial attention, and pointed out the use of the different movements in different diseases, and also gave rules for the application in special cases.

It is interesting to read about Thomas Sydenham, 1624–1689, a noted English physician, called 'the English Hippocrates,' who left the routine practice and based his upon the theory that there is in Nature a recuperative power which ought to be aided and not opposed; also saying that, 'If any one knew of the virtues of friction and exercise, and could keep this knowledge secret, he might make a fortune.'

Thomas Fuller, another English physician, published in 1704 *Medicina Gymnastica*, treating of the power of exercise in preserving health and curing disease.

F. Hoffman, who was physician to the King of Prussia in the first part of the 18th c., wrote that exercise is the best medicine for the body, and that we cannot imagine how salutory and favorable to health it is, 'for it excites the flow of the spirits, and facilitates the excretions from the blood.'

Clement J. Tissot, a French physician, who several times gained the prize of the Academie Royale de Chirurgie for his lectures, published in Paris, 1781, *Gymnastic Medicinale.*

John Friederich Simon at Basedow's school in Dessau in 1776, was the first gymnastic teacher in Germany, who was followed by John Jacob Du Toi in 1778. Salzmann at Schnipfenthal, in 1784, and at the same place Friedrich Guts Muths, 1786. He published his first book, *Gymnastics for Youth*, in 1793. It aroused lively interest; but he only aimed at creating military-school gymnastics.

Pestalozzi, in an article on bodily exercises in *Wochenschrift für Menschenbildung*, 1807, also awakened the minds on the subject. All helped to pave the way for Friedrich Ludvig Jahn, who is called the father of the German Turnkunst—or gymnastics. Jahn was born 1778, Aug. 11, and died 1852, Oct. 15. He opened his first public Turnplace in the Hasenheide, near Berlin, 1811, Aug. 10. Jahn's was a popular, all-sided gymnastics, very different from Guts Muth's, with its semi-military ideals. It aroused a great deal of antagonism, as being rough and dangerous. Thenceforward books on gymnastics, both for military and popular purposes, multiplied.

Adolph Spiess, born 1810, Feb. 3, died 1858, May 9, worked hard and successfully to introduce a more educational school gymnastics in Germany.

About the same time that Jahn began his crusade in Germany, Ling began his efforts in Sweden.

Pehr Henrik Ling was born in Småland, Sweden, 1776, Nov. 15, and died in Stockholm, 1839, May 3. He was dismissed from the Wexio Latin school, because he would not 'tell on' some of his school-fellows; then he commenced

travelling on foot through Sweden, Denmark, Germany, France and England, and made his living as a waiter, or as an interpreter, or by giving lessons in languages.

In 1793, Ling commenced study at Upsala University, Sweden, where he was graduated in Theology in 1797. He was then some years in Copenhagen, where he took lively part in gymnastics and fencing lessons by Capt. Nachtigall, who was one of Guts Muth's followers.

From the autumn of 1804, Ling was fencing master in the University of Lund in Sweden. But afterward, studying anatomy and physiology, and the influence of the exercises he founded a system of gymnastics corresponding with the knowledge of physiology, which is universally known as 'the Ling System.'

It is interesting to know, that when Ling first advanced his ideas of a normal school of gymnastics he was met with opposition and rebuff. 'We have jugglers and ropedancers enough,' the minister of the king said, 'without burdening the state treasury on that account.' Nevertheless, the Royal Gymnastic Central Institute was organized in Stockholm in 1813 by the government, and Ling was its director until he died. Here he showed his great organizing skill and untiring energy. Ling did not devote much time writing on gymnastics, and what is known of his ideas has been given to the world by his pupils, Branting, Georgü, and his son, Hjalmar Ling. They, as well as Hartelius, Nyblæus, Törngren, Liedbeck, Balck, and others have made many improvements and devised new exercises, but they have done so in accordance with the principles laid down by Ling.

A system of gymnastics, to be worthy of the name, must be based on the ascertained laws of physiology; it must aim at the attainment of a definite purpose through steadily and constantly progressive exercises; and this purpose be nothing less than the establishment of a due equilibrium between the powers physical and the powers intellectual. Of systems that possess all of these marks there are but two—the German and the Swedish. All other so-called systems are but parts of systems; they are partial in their foundation, in their purpose, or in their exercises.

Now, what does this term 'Physical Training' mean? Does it mean some exercises to bring the blood into circulation, or to develope certain muscles? Does it mean sports of athletes for the sake of combat and rivalry? Does it mean games for the sake of recreation? Or, does it mean a training of all the physical powers within the human body, whereby, also, the mind may be trained to a greater activity?

It certainly means a training of all the physical powers, and such a training cannot be possible in a few minutes' daily exercises. It must begin with the child. The little one must be taught how to sit, stand, and walk, encouraged and cheered. Then there must be certain exercises which will have later a strengthening, correcting, and recreative effect on the children.

The end of the exercises may be characterized as the promotion of health, and the acquisition of correct habits of action. The first is a hygienic end and the second is a distinctly educational end. The most important field of education is the nervous system, and the principles of all forms of physical training, however various and divergent these special ends may be, are based upon the power of the nervous system to receive impressions and register them on their effects.

It is not the business of the public and the preparatory schools to train up ballplayers, or professionals of any class. General bodily training is the kind demanded. Physical training in education is as old as education itself. *Mens sana in corpore sano* has been a truth for centuries. And men like Martin Luther, Pestalozzi, Froebel, Rousseau, and an army of educators have insisted that the body and mind should have equal training.

Never have men worked harder both physically and mentally than now. Never has there been such minute divisions between narrow limits, and never, therefore, has there been so much occasion to provide a system of education calculated to restore a fair proportion between the different parts of the body so essential to health and happiness.

The modern education must be to develop the physical as well as the mental powers; it should fill the mind with such principles as to make the coming generation healthier and happier.

A good physical training puts its stamp on the whole human being; it gives a noble and upright carriage; it gives self-reliance and courage; and it has a great disciplinary effect. But in spite of this fact there are hundreds of teachers who do not practise this knowledge in their schools. And why? Because they have 'no time.' More and more studies are being required; instead of learning something well and then leaving the school with a good foundation for future study, with a body and mind fully capable of doing some hard work; the children not infrequently are given 'overdoses' of studies and are graduated with a superficial knowledge and an unhealthy mind and body.

Carefully observing the physical condition of the children coming to the public schools, we find that the greater number of them are restless, round-shouldered, flat-chested, pigeon-toed, heel-walkers, with relaxation showing in all their movements. Thus sitting, standing, and walking are all of the same lumpishness; no power, no elasticity, or healthy vigor or proud self-reliance.

It is not an easy undertaking to straighten out such a little crooked being, who does not care himself. Still it can be done, and done well, as soon as we can properly enlist the services of the school teacher. The teacher's habits in the way of sitting, standing, and walking and her interest or non-interest are dangerously contagious.

If the teacher can be persuaded to lay aside her 'school-

ma'am' clothing and imagine herself a child again, going back to her own school days, remembering what she thought of this and of that, and how she used to fancy the one teacher and even hate the other, the trump has been played, and we can feel sure that she will always have a well set up class of bright-eyed children, ever ready for quick and energetic action whenever they are spoken to.

The American children are bundles of nerves, and they must be well trained along the right lines if they shall be able to do the work required of them. Several of our great theoretical educators hold that we should humor the play instinct of the children. They claim that play and games are all the physical training necessary in order that the children may have rest and recreation from their studies.

More than 30 years' experience as a teacher has taught the writer an entirely different lesson. Plays and games cannot and do not correct faulty carriage or abnormal developments. On the contrary, they favor them. A child with a crooked back will grow more and more crooked if left to play to suit his own will. Again, most games that children delight in are more or less exciting, and instead of making our restless, nervous children quiet and steady they frequently increase the restlessness and add to the excited condition of the child.

Plays and games have their place in physical training and should not be neglected, but they must not take the place of regular systematic exercises. Neither should they be practised before a hard study period. They ought to come in the afternoon, after the school is over. It would probably be a great gain if all the children could be induced to engage in games, but it is certain that those who are forced to play against their will do not get the recreation required. As soon as the play is obligatory it ceases to be recreative and assumes the shape of hard work.

Athletic sports in our high schools I believe are valuable as a means of recreation, that they conduce to bodily growth and improvement, and that their moral effects are of great value. It is well to promote them, and it is becoming increasingly necessary to regulate them. But it is unwise and short-sighted to consider them as constituting anything more than a single stage in the best bodily training. There is a great danger in our high school's tendency to imitate the colleges. The girls and the boys in the high school age are not developed enough to enter the strenuous athletic contests. Their athletics should be only as a supplementary training, under careful direction, or all the previous years' work in physical training will be reduced to nothing.

Gymnastics must be the foundation of all physical training-sports, athletics, etc. And with such a foundation we can gradually enter into any and all branches. It is a national characteristic of the American 'to beat'

someone else, and this is first and last in all our sports. The form and manner in which it is accomplished is hardly taken into consideration—save that it is done honorably and with fairness. The one who clears the stick at the highest point is the winner, no matter if he does it in beautiful form, or comes down like a ragbag, as long as he 'gets there.' The one who puts the shot farther than the others with one hand is considered the best, even if he can do nothing with the other hand. The one who is a good sprinter will do nothing but sprint short distances; still he has a great reputation of being a great athlete, though almost any boy could beat him in other games. And so on. Of course, if the only object of athletics is to beat in one particular branch, it may be right to concentrate all the energy in that direction, but the time will come when the man will wish he had not done so.

The frequent use of one hand or foot and the little attention given to form in school days is sure to produce a one-sided development, with more or less curvature of the spine and pressure on some part of the lungs. This will hinder the free circulation of the blood, and lung and heart trouble may ensue, The one who is a 'runner' taxes his heart to the utmost, and will suffer for this foolishness later in life, if, indeed he is able to live long enough to suffer. Boys and girls of the high school age are growing most rapidly, and just then is the time to be most careful. One-tenth of a one-sided exercise at that time will do a great deal more harm than ten times as much during college life.

I do not think much of athletics for girls but so much more of systematic and graceful exercises, both with and without apparatus. I like to see a strong girl who is able to 'chin' the bar, or vault in good style, or who can execute free movements, or difficult evolutions in marching, or gracefully use her feet in dancing to music. And I encourage basket-ball, field hockey, and other games which, during the spring and autumn may be played out-of-doors, and during the winter in the gymnasium after school hours. And girls who need it should be given special corrective exercises to practise daily, and encouraging and cheerful advice should be given them.

All the boys should take part in a regular systematic course of training in gymnastics and athletics. Every boy should run, hurdle, and jump in good form, put shot and throw discus with either hand, etc., etc. And all should play ball, foot-ball, base-ball, basket-ball, etc., for the sake of the exercise and the physical and moral training, and not for the sake of getting a winning team.

The success of physical training depends on how the lessons are conducted. They must be made interesting. Frequent scolding and hard criticism will not make it so. We must show the children a good example in carriage, walking, standing, sitting, and make them understand the superiority of a well developed person, both mentally and physically.

Then first we will be able to produce a physical training worth having, and which may be practised by the individual later on.

PHYSI'CIANS, The Royal College of (of London): founded 1518 by the munificence of Thomas Linacre, priest and distinguished physician (1460–1524). In 1518, through the influence of Cardinal Wolsey, he obtained from Henry VIII. letters patent granting to John Chambre, himself, and Ferdinandus de Victoria, the acknowledged physicians to the king—together with Nicholas Halsewell, John Francis, Robert Yaxley, and all other men of the same faculty in London—to be incorporated as one body and perpetual community or college. They were permitted to hold assemblies, and to make statutes and ordinances for the government and correction of the college and of all who exercised the same faculty in London and within seven miles thereof, with an interdiction from practice to any individual unless previously licensed by the pres. and college. Linacre, first pres., held the office till his death. His house in Knightrider street, which he bequeathed to the college, continued in its possession till 1860. In 1825 the present edifice in Pall-Mall East was opened under the presidency of Sir Henry Halford.

In 1540 an act was passed in which it was declared explicitly that 'surgery is a part of physic, and may be practiced by any of the company or fellowship of physicians'—a doctrine which in later times has been totally repudiated by the London collegiate body, who, until a few years ago, would not admit to their privileges a member of the Royal College of Surgeons unless he formally resigned his surgical diploma. In 1860 the presidency became an annual office, open to the fellows at large, who are also the electing body. As at present constituted, the college consists of Fellows, Members, Licentiates, and Extra-Licentiates. The *Fellows* are elected from members of at least four years' standing, who have distinguished themselves in the practice of medicine, or in medical or general science or literature. The government of the college is vested in the president and fellows only. The present *Members* consist of persons who had been admitted, before 1859, Feb. 16, licentiates of the college; of extra-licentiates who have complied with certain conditions; and of persons who have attained the age of 25 years, who do not dispense or supply medicine, and who, after being duly proposed, have satisfied the college 'touching their knowledge of medical and general science and literature,' and that they have 'been engaged in the study of physic during a period of five years, of which four years at least shall have been passed at a medical school recognized by the college.' No candidate is admissible if engaged in trade or connected with a druggist's business, or who even practices medicine in partnership with another practitioner, so long as the partnership lasts, or who refuses

to publish, when required, the nature and composition of any remedy that he uses. The *Members* alone are eligible for the fellowship. They constitute a portion of the corporation, so far as they have the use of the library and museum, and the privilege of admission to all lectures. The examiners for the membership are the president and censors. The *Licentiates* are not members of the corporation; they have access to the museum, lectures, and reading-room.

PHYSI'CIANS OF EDINBURGH, The Royal College of: established 1617, in an attempt to incorporate the practitioners of medicine, and raise the standard of the profession. King James I. of England granted an order for its establishment; Cromwell in like manner issued a patent in its favor; but both were frustrated by the religious dissensions of the times, and it was not until 1681 that the body became incorporated under a charter from Charles II. A new charter with many important provisions was issued in 1861. There is a library of more than 20,000 vols.

PHYSICK, *fĭz'ĭk*, Philip Syng, M.D.: surgeon: 1768, July 7—1837, Dec. 15; b. Philadelphia; son of Edmund Physick, who was agent of the Penn family. He graduated from the Univ. of Pennsylvania 1785, studied medicine in this country and under John Hunter in London, and was appointed a house-surgeon in a London hospital 1790, and the following year the Royal College of Surgeons issued his license. He graduated from the Univ. of Edinburgh 1792, commenced practice in Philadelphia 1793, and rendered brilliant service in the hospitals in the yellow fever epidemics of that decade. By post-mortem examinations, he made valuable discoveries regarding the nature of this disease. He commenced lecturing on surgery at the Univ. of Pennsylvania 1800, was prof. of surgery in that institution 1805–19, and of anatomy 1819–31. He is said to have been the first American honored with membership in the French Acad. of Medicine. He invented valuable instruments, devised improved methods, and was one of the most brilliant operators of his time. He died in Philadelphia.

PHYS'IC NUT (*Curcas*): genus of plants of nat. order *Euphorbiaceæ*, having a 5-partite calyx, 5 petals, and 8–10 unequal-united stamens. The species are not numerous. They are tropical shrubs or trees, having alternate, stalked, angled or lobed leaves, and corymbs of flowers on long stalks; and notable for the acrid oil of their seeds. The Common Physic Nut of the E. Indies (*C. purgans*), now common in the W. Indies also, and other warm parts of the world, is a small tree or bush, with milky juice. It is used for fences in many tropical countries, and serves the purpose well, being much branched and of rapid growth. The seeds, though not unpleasant to the taste, abound in a very acrid fixed oil, which makes them powerfully emetic and purgative, or in large doses poisonous. The expressed oil, called

Jatropha Oil, is used in medicine like Croton oil, though less powerful; it is used also in lamps.—The FRENCH P. N., or SPANISH P. N. (*C. multifidus*), shrub, native of tropical America, with many-lobed leaves, yields a purgative acrid oil, called *Oil of Pinhoen.* To this genus belongs the PINONCILLO (*C. lobatus*) of Peru, whose seed is eaten when roasted, and has an agreeable flavor; though when raw it is a violent purgative. When an incision is made in the stem of this tree, a clear bright liquid flows out, which after some time becomes black and horny. It is a very powerful caustic, and retains this property for years.

PHYSICS, *fĭz'ĭks* [Gr. *phusikos*, natural]: term employed by Aristotle, and until recently, for all that pertains to nature; now restricted to the sciences that deal with the forces of nature, exclusive of vital and mental: the phenomena and laws of the inorganic, studied experimentally, but considered for the most part abstractly and mathematically. The late Prof. J. Clerk-Maxwell divided P. into: I. FUNDAMENTAL SCIENCE OF DYNAMICS, including: (1) *Kinematics*, the kinds of motion of which a body or system of bodies is capable; (2) *Statics*, the equilibrium of forces; (3) *Kinetics*, the relations between the motions of bodies and the forces acting on them; (4) *Energetics*, conditions of action with transference of energy from one body to another: and all this subject has the following relations to the nature of the body: *a*, the dynamics of a particle; *b*, that of a connected system, which may be considered as rigid or as fluid, including possible motion, conditions of equilibrium (hydrostatics), the action of the force in producing motion (hydrodynamics), the force called into play by change of volume; also the dynamics of an elastic body, and of a viscous. II. THE SECONDARY SCIENCES OF PHYSICS: (1) *Theory of Gravitation;* (2) *Theory of the Action of Pressure and Heat* in changing dimensions, this including, *a*, physical states (gaseous, liquid, and solid); *b*, effects of heat on temperature, size, form, and physical states; *c*, thermometry; *d*, calorimetry; *e*, thermodynamics (convertibility of heat and work); *f*, dissipation of energy; *g*, propagation of sound, vibration; (3) *Theory of Radiance*, including, *a*, geometrical optics; *b*, velocity of light in different media; *c*, prismatic analysis and fluorescence; *d*, wave-lengths and wave-periods; *e*, polarized light, etc.; *f*, quantity of energy in total radiance; *g*, the three primary colors; (4) *Electricity and Magnetism: a*, electro-statics; *b*, electro-kinematics; *c*, induction, diamagnetism; *d*, electro-magnetism; *e*, electro-kinetics. Under *b* comes electro-chemistry, terrestrial magnetism, etc. Chemistry is a physical science, but extends beyond dynamics.

PHYSIOCRAT, *fĭz'ĭ-ō-krăt* [Gr. *phusis*, nature; *kratos*, force]: in political economy, one who accepted the principles and maxims laid down by Quesnay (q.v.) and other thinkers and practical men, who, about the middle of the 18th c., constituted the school of the *économistes*, as they called themselves, or *physiocrates*, as they were afterward called by one of their own number. PHYS'IOCRAT'IC, a. *-ĭk*, pertaining to the physiocrats or their doctrines. PHYS'IOC'RACY, n. *-ra-sĭ*, the sum of the economic tenets held by the physiocrats.—The term *Physiocrat* was designed to declare that economic relations must stand on a basis of natural right, not on custom, traditional usage, ancient institution, or any system of positive law. All men, the physiocrats held have the same natural rights. Society is a state of contract between individuals, and its object is the limitation of the natural freedom of each, so far as the assertion of the rights of the others requires. Government must be restricted to securing this end. Labor should be undisturbed and unfettered, and its fruits guaranteed to the possessor; in other words, property should be sacred. Each citizen should be allowed to make the most of his labor; therefore freedom of exchange should be insured, and competition in the market should be unrestricted, no monopolies or privileges being permitted to exist. The physiocrats held only those labors truly 'productive' which add to the quantity of raw materials: the real annual addition to the wealth of a community consists, according to them, of the excess of the products of agriculture, mining, etc., over the cost of production. The manufacturer simply gives new form to these products, and the higher value of the object after it has passed through his hands represents only the quantity of provisions and other materials used in its elaboration. Commerce simply transfers wealth already existing from hand to hand; the gains of the commercial class are made at the cost of the nation, and should be as small as possible. Manufacturers, merchants, professional men, and all individuals rendering personal service, are 'useful,' but their work is 'sterile;' they live on the superfluous earnings of agriculture and the 'productive' occupations. Unrestricted freedom of trade tends, through competition, to reduce as far as possible the income of the mercantile and manufacturing class; therefore *Laissez faire*, or 'Hands off,' should be the motto of government. The revenue of the state must be derived altogether from the net product—the excess of agricultural and mining production; and the revenue ought to be raised in the most direct way—namely, by a single tax on land. The principal aim of the physiocrats was to discredit the policy of the European governments of that time in their dealings with industry: in that respect their efforts were successful; for at that time governmental action had invaded every detail of business, every process of manufacture, every transaction of trade; it was the reign of unqualified protection and rampant monopoly. But it came to be seen later

after trial, that *laissez faire* is not less mischievous than excessive governmental interference, and that individualism is not the all-sufficient remedy of social ills. For the physiocrats, government was only a necessary evil: the tendency of modern legislation all over the civilized world, as evidenced by land laws, sanitary enactments, public-school systems, interstate commerce regulation, etc., is to regard government as an indispensable good.

PHYSIOGENY, n. *fĭz-ĭ-ŏj′ĕn-ĭ* [Gr. *phusis*, nature; *genos*, race]: in *biol.*, the germ-history of the development of vital activities in the individual.

PHYSIOGNOMY, n. *fĭz′ĭ-ŏg′nō-mĭ*—see *Note* [Gr. *phusis*, nature; *gnōmōn*, one who knows, *gnōmē*, opinion]: the particular cast or expression of the face; the art of determining the character and disposition of a person by an examination of the features of the face: in *botany*, the general appearance of a plant without any reference to its botanical characters. PHYS′IOG′NOMIST, n. *-mĭst*, one who is skilled in physiognomy. PHYS′IOGNOM′IC, a. *-nŏm′ĭk*, or PHYS′IOGNOM′ICAL, a. *-ĭ-kăl*, pertaining to. PHYS′IOGNOM′ICALLY, ad. *-lĭ*. PHYS′IOGNOM′ICS, n. plu. *-ĭks*, the signs or features of the face which indicate the disposition and character of the mind, and the state of the body; the same as physiognomy. *Note.—Physiognomy* is now generally pronounced *fĭz′ĭ-ŏn′ŏ-mĭ*, which would, as far as pronunciation is concerned, make it appear as derived from Gr. *phusis*, nature; *nomos*, law—whereas the root-words are Gr. *phusis*, and *gnōmōn*, one who knows. In the Gr. word *phusiognō′mia* the judging of the character by the countenance, the *g* or *γ* is sound *n*, and it ought to be sounded in the Eng. derivative.

PHYSIOG′NOMY: art of judging of the character from the external appearance, especially from the countenance. The art is founded upon the belief, long and generally prevalent, that there is intimate connection between the features and expression of the face and the qualities and habits of the mind; and every man is conscious of instinctively drawing conclusions in this way for himself with more or less confidence, and of acting on them to a certain extent in the affairs of life. Yet the attempt to reach this conclusion by application of certain rules, and thus to raise the art of reading the human countenance to the dignity of a science, though often made, has never yet been very successful. Comparisons have been instituted for this purpose between the physiognomies of human beings and of species of animals noted for peculiar qualities, e.g., the wolf, the fox, etc. This was begun by Della Porta, a Neapolitan (d. 1615), and was carried further by Tischbein. The subject of P. was eagerly prosecuted by Thomas Campanella; and later and more thoroughly by Lavater (q.v.).—Practical physiognomy, or the reading of individual character, has some generally acknowledged rules; but is likely to fail in many instances when carried into detail, because of the many counterbalancing and varying elements involved. A strong nose may in itself

be indicative of strong qualities, but be neutralized by a weak jaw or other facial or cranial peculiarities. And the factors not yet understood are too many to render an estimate infallible, even granting that physical conformation is in all points correspondent with character. Still, there are—with the individual exceptions always occurring—some features that go with certain traits. A manifestly fine organization, including contour, skin, and hair, tells its own story; as does the coarse. So does a well-developed head, though some eminent men have small heads. A projecting brow goes with strong perceptions, usually. Fulness of eye, and of the outer upper lid, and of the space below the eye, has marked many persons of large intelligence and power of expression. An upraised full lower lid and full lips are sensuous. Smiling eyes may either indicate humor or be associated with cunning. A straight and not clumsy nose shows æsthetic tendency; a flat or a pug nose, or formless, accompanies low grade; an aquiline and hooked nose may be mephistophelian; a *retroussé* nose gives the impression of pertness. Coarse lips, without the curves of beauty, go with appetite; thin, compressed lips indicate a cold, secretive, calculating nature. A small or retreating chin generally belongs to a negative character; a full chin, especially if vertically divided, is sensuous; a full chin with a large square lower jaw is an index of strong will. The shape of the ears, and the color of eyes and hair, have been debated; in general, the dark are of quicker, stronger temperament; but gray eyes have very often accompanied ability and genius. Books on practical P. are more or less conflicting and overpositive in details. To diagnose a thief or criminal by feature is impossible; the criminal class, to a considerable extent, simply have animal or low-grade features. Some of the ablest workers for good have the visible points of a pugilist. *Character* depends chiefly on *ruling purpose.* As regards characteristics, we look most to fleeting expression and personal bearing, and trust most in intuition and indefinable impression.—The first truly scientific works on the anatomy of expression were by Sir Charles Bell (q.v.). Darwin's *Expression of the Emotions* (1872) treats especially of the physiology and utility of expression in animals and men, with reference to his theories.

PHYSIOGRAPHY, n. *fĭz'ĭ-ŏg'ră-fĭ* [Gr. *phusis*, nature; *graphō*, I write]: term formerly applied to a branch of mineralogy; adopted by Prof. Huxley as a convenient name for an exposition of the principles that underlie physical geography, and including the elements of physical science. P. is thus understood to involve a compendious discussion of gravitation, heat, the composition of the crust of the earth, the movements of the sea, the phenomena of the atmosphere, and many cognate subjects, treated in this work under separate heads. PHYS'IOGRAPH'ICAL, a. *-ō-grăf'ĭ-kăl*, pertaining to physiography. PHYS'IOGRAPH'ICALLY, ad. *-lĭ.*

PHYSIOLATRY, n. *fĭz-ĭ-ŏl′a-trĭ* [Gr. *phusis*, nature; *latreia*, worship]: nature-worship; the cult of the powers of nature.

PHYSIOLOGUS, *fĭz-ĭ-ŏl′ō-gŭs* [Gr. *phusis*, nature; *logos*, discourse]: one of the names given to a collection of about 50 Christian allegories, with imagery mostly from the animal world; much read in the middle ages: bestiary: see BESTIAIRES. Fragments or complete copies of the P. are extant in Greek, Syriac, Armenian, Ethiopic, Arabic, Latin (in several different forms, one giving the collection complete, another in abridgment, a third in a metrical version), old Eng. (metrical), old French (metrical), old High Ger. (in prose and in verse), Icelandic, Anglo-Saxon, Provençal.

PHYSIOLOGY, n. *fĭz′ĭ-ŏl′ŏ-jĭ* [Gr. *phusiologia*, an inquiry into the nature and origin of things—from *phusis*, nature; *logos*, discourse: F. *physiologie*]: science which treats of the vital actions or functions performed by the organs of plants and animals. PHYS′IOL′OGIST, n. *-jĭst*, one who studies or treats of physiology. PHYS′IOLOG′IC, a. *-ō-lŏj′ĭk*, or PHYS′IOLOG′ICAL, a. *-ĭ-kăl*, pertaining to physiology; relating to the science of the properties and functions of living beings. PHYS′IOLOG′ICALLY, ad. *-lĭ*. PHYSIOL′OGIZE, v. *-ŏ-jīz*, to speculate in physiology. —*Physiology*, as the science which treats of the phenomena which normally present themselves in living beings, of the laws or principles to which they are subject, and of the causes to which they are attributable, is a branch of Biology, the science which investigates the nature and relations of living bodies. As dealing with *functions*, P. is distinguished from morphology, the branch of biology which takes cognizance of the structure of the parts or organs. According as it has to do with one or other of the two great groups of organic beings, Physiology is *Animal Physiology* or *Vegetable Physiology*. *General Physiology* includes the structure and chemical composition of bodies, though anatomy and histology precede Physiology in the order of the sciences. *Comparative Physiology* deals with the resemblances and diversities between the vital actions of various groups and species. *Special Physiology* treats of the vital phenomena of particular species, *Human Physiology* being restricted to the human subject. The functions expounded by P. are usually regarded as under three main heads: (1) Nutrition; (2) Innervation; and (3) Reproduction. For the principles of *Vegetable Physiology*, see that title: for the various portions of *Animal Physiology*, especially human, with the anatomy of the organs concerned, see such titles as DIGESTION: CIRCULATION: RESPIRATION: NUTRITION: BRAIN: NERVOUS SYSTEM: SPINAL CORD: AUDITORY NERVE: EAR: NOSE, ETC.: REPRODUCTION: and many others.

PHYSIOPHILY, n. *fĭz-ĭ-ŏf′ĭ-lĭ* [Gr. *phusis*, nature; *philos*, loving]: in *biol.*, the tribal history of the functions. In the case of man, a large part of the history of culture falls under this head.

PHYSIQUE, n. *fĭ-zēk′* [F. *physique*, appearance of the body—from Gr. *phusĭkos*, natural]: the natural constitution or physical structure of a person as it appears to the eye.

PHYSNOMY, or PHISNOMY, n. *fĭz′nō-mĭ:* in *OE.*, a corrupted spelling of *physiognomy*.

PHYSOGRADE, a. *fĭz′ō-grād* [Gr. *phusa*, an air-bladder; L. *grădi*, to walk]: moving in the water by air-bladders—applied to a tribe of sea-nettles.

PHYSOMETRA, n. *fĭz′ō-mē′tră* [Gr. *phūsaō*, I inflate or distend; *mētra*, a womb—from *mētēr*, a mother]: an accumulation of air in the uterus which causes an enlargement of the abdomen.

PHYSOMYCETES, n. *fĭz′ō-mī-sē′tēz* [Gr. *phusa*, a bladder; *mukēs* or *mukēta*, a fungus]: a division of the Fungi in which the thallus is floccose, and spores are surrounded by a vesicular veil or sporangium, as in bread-mold.

PHYSOPHORIDÆ, n. plu. *fĭz′ō-fŏr′ĭ-dē* [Gr. *phusa*, an air-bladder; *phorĕō*, I bear]: an order of oceanic Hydrozoa.

PHYSOSTIGMA, n. *fĭz′ō-stĭg′ma* [Gr. *phusa*, bellows, and *stigma:* name betokening the bladder-like apex of the style]: Calabar Bean (q.v.). PHYS′OSTIG′MINE, n. *-mĭn* or *-mēn*, alkaloid principle of the Calabar bean: it is highly poisonous, but is devoid of taste.

PHYTELEPHAS, n. *fī-tĕl′ĕ-făs* [Gr. *phuton*, a plant; *elĕphas*, an elephant, ivory]: genus of S. Amer. palms whose nuts contain a substance like ivory, and known by the name vegetable ivory—known also by the name *Jagua plant;* ord. *Palmæ:* see IVORY, VEGETABLE.

PHYTIVOROUS, a. *fī-tĭv′ō-rŭs* [Gr. *phuton*, a plant; L. *voro*, I eat]: applied to animals that subsist on plants; herbivorous.

PHYTOCHLOR, n. *fī′tō-klōr* [Gr. *phuton*, a plant; *chlōros*, green]: the green coloring matter of plants; chlorophyl.

PHYTODERMA, n. *fī′tō-dėr′mă* [Gr. *phuton*, a plant; *derma*, skin]: any fungus or vegetable parasite growing on the skin. PHYTODERMATA, n. pln. *-dėr′mă-tă*, skin diseases caused by fungi.

PHYTOGENY, n. *fī-tŏj′ĕ-nĭ*, or PHYTOGENESIS, n. *fī′tō-jĕn′ĕ-sĭs* [Gr. *phuton*, a plant; *gennaō*, I produce]: in *bot.*, the doctrine of the generation or production of plants; the development of the plant.

PHYTOGEOGRAPHY, n. *fī′tō-jē-ŏg′ră-fĭ* [Gr. *phuton*, a plant, and Eng. *geography*]: the study of the laws regulating the distribution of plants, and of different plant regions.

PHYTOGRAPHY, n. *fī-tŏg′ră-fĭ* [Gr. *phuton*, a plant; *graphō*, I write]: the scientific description of plants, treating of their character, habits, distribution, functions, and properties: descriptive botany. PHY′TOGRAPH′ICAL, a. *-tō-graf′ĭ-kăl*, pertaining to phytography.

PHYTOID, a. *fī'toyd*, or PHYTOIDAL, a. *fī-toy'dăl* [Gr. *phuton*, a plant; *eidos*, appearance]: resembling plants; plant-like.

PHYTOLACCA, *fī-tō-lăk'kâ:* genus of exogenous plants, of nat. order *Phytolaccaceæ*. This order contains about 70 known species, half-shrubby and herbaceous plants, natives of warm parts of Asia, Africa, and America. It is nearly allied to the order *Chenopodiaceæ*, and to the *Polygoneæ*. The genus *Phytolacca* has for its fruit a berry with 8–10 cells, each cell one-seeded. *P. decandra*, the Poke, Poke-weed, or Pocan, native of N. America, now naturalized in parts of s. Europe, is sometimes cultivated for its young shoots, which, when blanched, are eaten like asparagus, though the leaves are acrid: the root is an emetic, and is applied externally for itch and ringworm; and a preparation of the berries is used in rheumatism and syphilis, and for adulteration of wine. The Poke-weed is a characteristic Amer. plant: other names for it are Inkberry-weed, Garget, Redweed, Red-ink-plant, Foxglove, Pigeon-berry, Scoke, etc.—The young shoots of *P. acinosa* are boiled and eaten in the Himalayas, those of *P. octandra* in Cayenne, and a Chinese species has recently been introduced into some western countries under the name *P. esculenta*.

PHYTOLITE, n. *fī'tō-līt* [Gr. *phuton*, a plant; *lithos*, a stone]: in *geol.*, a general term for a fossil plant.

PHYTOLOGY, n. *fī-tŏl'ŏ-jĭ* [Gr. *phuton*, a plant; *logos*, discourse]: name sometimes used for *Botany*, the science of the vegetable kingdom; the scientific study of plants. PHYTOLOGICAL, a. *fī'tō-lŏj'ĭ-kăl*, pertaining to phytology. PHYTOL'OGIST, n. *-tŏl'ŏ-jĭst*, a scientific botanist.

PHYTON, n. *fī'tŏn* [Gr. *phuton*, a plant]: in *bot.*, a name sometimes given to the simple individual plant as represented by a leaf.

PHYTONOMY, n. *fī-tŏn'ō-mĭ* [Gr. *phuton*, a plant; *nomos*, a law]: the science of the origin, growth, and arrangement of plants.

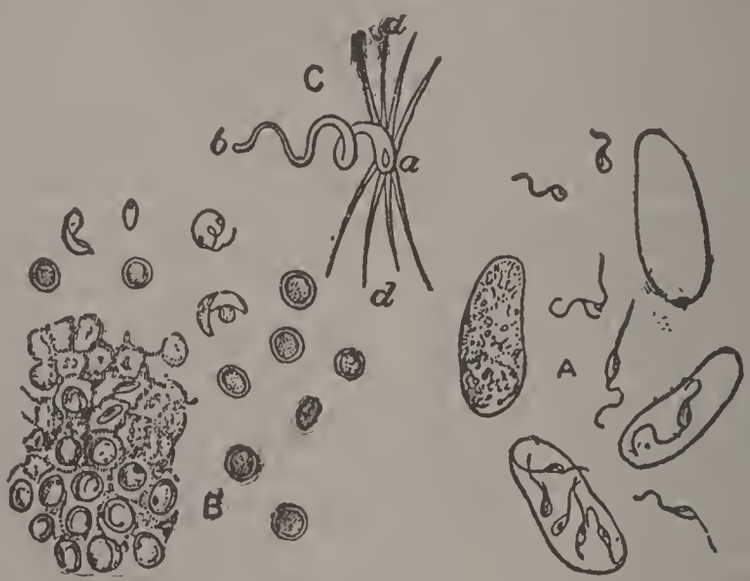
PHYTOPATHOLOGY, n. *fī-tō-pa-thŏl'o-jĭ* [Gr. *phuton*, a plant; Eng. *pathology*]: science of the knowledge of the diseases of plants.

PHYTOPHAGOUS, a. *fī-tŏf'ă-gŭs* [Gr. *phuton*, a plant; *phagein*, to eat]: plant-eating, applied to animals that live on vegetable substances; herbivorous; the same as *phytivorous*.

PHYTOTOMY, n. *fī-tŏt'ō-mĭ* [Gr. *phuton*, a plant; *tomē*, a cutting]: the dissection of vegetable organized bodies. PHYTOT'OMIST, n. *-mĭst*, one who is skilled in phytotomy.

PHYTOZOIDS, n. plu. *fī'tō-zō'ĭdz* [Gr. *phuton*, a plant; *zōŏn*, an animal; *eidos*, resemblance]: in *bot.*, the male reproductive elements in the cellules of the antheridia in cryptogams, which exhibit active movements at certain periods of their existence, and thus resemble animalcules; spermatozoids or antherozoids.

PHYTOZOON, n. *fī′tō-zō-ŏn* [Gr. *phuton*, a plant; *zōŏn*, an animal]: a plant-like animalcule, or one living in the tissues of plants: plu. PHY′TOZO′A, *-zō′ă*, or PHY′TOZO′ONS, *-zō′ŏnz*, or ANTHEROZOIDS, in *bot.*, moving filaments in the antheridia of cryptogams; the male reproductive elements, minute bodies, are produced amidst a mucilaginous fluid in the antheridia of many cryptogamous plants (Algæ, Hepaticæ, Mosses, Ferns), which are either aquatic or thrive in moist situations. In some many-celled antheridia of the higher cryptogamous plants, each cell is devoted to the production of a single phytozoon. When the antheridium is mature, and bursts, the phytozoa move for a short time by means of cilia—a provision, apparently, for their reaching the pistillidia. Great diversities exist in the phytozoa of different cryp-



Phytozoa:

(From Carpenter on the *Microscope.*)

A. Antherozoids of *Fucus platycarpus* (a sea-weed), some of them free, others still included in their antheridiol cells.
B. Cellular contents of an antheridium or *Polytrichum communi* (a moss), mature and discharging the antherozoids.
C. Antherozoid of *Pteris serrulata* (a fern), showing *a*, its large extremity; *b*, its small extremity; *d*, *d*, its cilia.

togamous plants. Cryptogamous plants, which, as lichens, live in dry situations, have no phytozoa, though it is supposed that they have organs destined to the same purpose, but destitute of the power of motion by cilia.

PI, n. *pī:* in *print.*, mixed, disarranged type: V. to mix type: see PIE 2.

PI, in Geometry: the number $\pi = 3.14159\ldots$ expressing the ratio of the circumference of a circle to its diameter. Its value has been computed to 707 decimal places (*Royal Society Proceedings*, 1873). It is a *transcendental* number, i. e., it cannot be found by extraction of roots or solution of algebraic equations. It is for this reason that the quadrature of the circle is impossible by means of rules and compass. See QUADRATURE OF THE CIRCLE.

PIACENZA, *pē-â-chĕn′zâ:* city of n. Italy, province of

P.; on the right bank of the Po, 2 m. below the confluence of the Trebbia with that river, 43 m. s.e. of Milan, 36 m. w.n.w. of Parma. Beautifully situated, 217 ft. above sea-level, on a fine plain, confined on the s. by well-cultivated hills, the city itself is gloomy and desolate in appearance. Its streets are broad and regular—that called the *Stradone* is one of the most beautiful in Italy—but many of them are unfrequented and grass-grown. It contains numerous palaces, and about 50 churches. The cathedral, in the ancient Lombard style, founded in the 11th c., is famous for its richly-curious and grotesque internal decorations, for its numerous sculptures, its paintings; and for a number of frescoes of great grandeur, by Caraccio, Guercino and others. The Church of Sant' Antonio, the original cathedral of Piacenza, was founded 324, but has been several times rebuilt. The Palazzo Farnese, founded 1558, formerly a sumptuous edifice, which has been long in use as a barrack; the Palazzo del Commune, and the Collegio dei Mercanti are fine monuments of art. The principal square is the Piazza Cavalli, named from the colossal bronze equestrian statues of the dukes Alessandro and Rannuccio Farnese. This town occupies an important military position—a fact appreciated by those who fortified it with solid walls and a strong castle, which, till 1859, were guarded by the Austrians. On being forced from the city by the war of 1859, the Austrians did not destroy the works, and the Italian government has strengthened and extended them by externally defended works, and a formidable intrenched camp, which unites and protects the other works on the right bank of the Po. There are manufactures of silks, fustians, linens, hats, pottery, wine, cheese, and machinery. In the vicinity are valuable marble quarries. Pop. (1901) 36,064.

Piacenza, called by the Romans *Placentia*, on account of its pleasing situation, is mentioned first B.C. 219, when a Roman colony was settled there. B.C. 200 it was plundered and burned by the Gauls; but rapidly recovered its prosperity, and was long an important military station. Piacenza was the w. terminus of the great Æmilian road, which began at Ariminum on the Adriatic. In later history, it was important as one of the independent Lombard cities. The city entered the Lombard League in the 12th century, and in the 17th century, with Parma, it became a duchy of the Farnese family.

PIACULAR, a. *pī-ăk'ū-lėr* [L. *piac'ulum*, a sin-offering; *pio*, I appease—from *pius*, devout]: having power to atone; expiatory; that requires expiation.

PIA MATER, n. *pī'ă-mā'tėr* [L., kind mother]: a delicate, fibrous, and highly vascular membrane, which immediately invests the brain and spinal cord—the *dura-mater* being the outer membrane. See NERVOUS SYSTEM.

PIANO, ad. *pĭ-â′nō* [It. *piano*, softly, low—from ***piano***, even, smooth—from L. *plānus*, even, smooth]: in *music*, indication that the strain where it occurs is to be played or sung with less than the average force: its abbreviation is *p*, and *pp*, or *ppp*, for *pianissimo*, signifies very soft, or as soft as possible. On the other hand *forte*, abbreviated *f*, denotes a more than usual force; and *ff*, *fff*, for *fortissimo*, a still greater degree of force. The gradual transition from *piano* to *forte* is indicated by the sign <; from *forte* to *piano* by the sign >. PIANO, n. *pĭ-ăn′-nō*, a keyed musical instrument (see PIANOFORTE). PIANISSIMO, ad. *pĭ-â-nĭs′sĭ-mō*, very softly. PIANIST, n. *pĭ-ăn′ĭst*, a performer on the pianoforte. PIAN′OGRAPH, n. *-grăf*, in *mus.*, machine which, on being attached to a pianoforte, inscribes what is played.

PIANO-FORTE. *pĭ-ăn′ō-fōr′tā*, contracted into *Piano* [It. *piano*, soft; *forte*, strong—from L. *fortis*, strong]: stringed musical instrument, played by keys, developed out of the clavichord and Harpsichord (q.v.), from which the P. differs principally in the introduction of hammers, to put the strings in vibration, connected with the keys by a mechanism that enables the player to modify at will the intensity of the sounds; whence the name of the instrument.

The idea of the P. was conceived independently about the same time by three persons in different parts of Europe—Schröter, German organist; Marius, French harpsichord-maker; and Bartolomeo Cristofali, harpsichord-maker of Padua. Priority of invention (1714) is due to the Italian maker. Schröter's discovery was followed up in Germany by Silbermann of Strasburg. Spät of Ratisbon, Stein of Augsburg, and others. The first P. seen in England was made at Rome by Father Wood, an English monk there. A few German manufacturers and workmen settling in London, gave impetus to the new instrument. The English P. has been brought to its present high state by Broadwood, Stodart, Collard, Wornum, Hopkinson, and others. Érard (see ÉRARD, SEBASTIEN) and Petzold made many improvements in France; Germany has long been famous for its pianos; American makers have now become well known throughout the civilized world. The compass of the early P. was, like that of the harpsichord, 4 to 5 octaves, and has gradually increased to 6⅞, or 7 octaves, occasionally more.

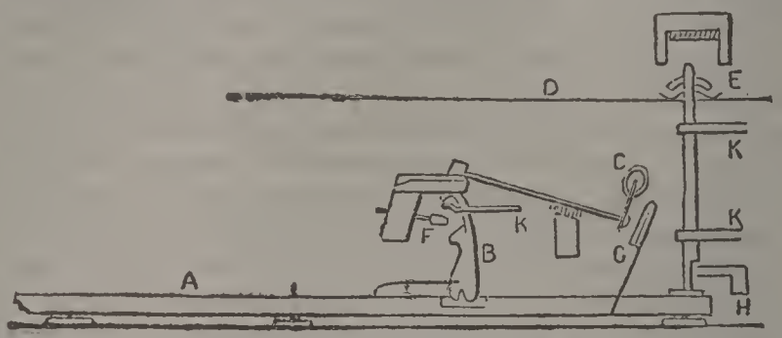
Favorite among various forms which the instrument assumes has been that of the grand P., derived from the harpsichord, with the strings placed horizontally parallel to the keys. The strings are stretched across a compound frame of wood and metal, composed of bars, rods, and strengtheners of various kinds—appliances necessary to resist the enormous tension. This framework includes a wooden sound-board. The mechanism by which hammers are connected with the keys, is called the *action* of the instrument. In the earliest pianofortes, the hammer was raised from below by a button attached to an upright wire fixed on the back-end of the key. The

impulse given to the hammer caused it to strike the string, after which it immediately fell back on the button, leaving the string free to vibrate. This was called the *single action*. As the hammer, when resting on the button with the key pressed down, was thus necessarily at a little distance from the string, the effectual working of this action required that a certain impetus should be communicated to the hammer to enable it to touch the string. Hence it was impossible to play very *piano*, and it was found that if the hammer was adjusted so as to be too close to the string when resting on the button, it was apt not to leave the string till after the blow had been given, thereby deadening the sound. This defect was remedied by a jointed upright piece called the *hopper*, attached to the back-end of the key, in place of the wire and button. When the key was pressed down, the hopper, engaging in a notch in the lower side of the hammer, lifted it so close to the hammer, that the lightest possible pressure caused it to strike; and at this moment, when the key was still pressed down, the jointed part of the hopper, coming in contact with a fixed button as it rose, escaped from the notch, and let the hammer fall clear away from the string. To prevent the hammer from rebounding on the string, a projection called the *check* was fixed on the end of the key, which caught the edge of the hammer as it fell, and held it firmly enough to prevent it from rising. A necessary part of the action is the *damper*, which limits the duration of each particular note, so as to cause it to cease to sound as soon as the pressure is removed from the key. It consists of a piece of leather resting on the top of the string, and connected with the back-part of the key by a vertical wire. When any key is pressed down, its damper is raised off the string, so as to allow the sound produced to be clear and open; but immediately on the finger being lifted off the key, the damper-wire falls, and the damper again presses on the string, muffling and stopping the vibration. The whole range of dampers may, when required, be raised by the use of the damper-pedal, so as to prolong the sound of one note into another.

One further frequent and important addition to the action may be alluded to. In the mechanism above described, the key must rise to its position of rest before the hopper will again engage in the notch of the hammer for another stroke; hence, a note cannot be repeated until time has been allowed for the full rise of the key. The *repetition action* is a contrivance, varying in different instruments, for riddance of this defect, by holding up the hammer at a certain height while the key is returning.—For mode of producing the notes, see SOUND.

Great difference of detail exists in the actions of different makers. Some are more complicated than others; but in all are found the same essential parts, modified only in shape and arrangement. The subjoined figure represents one of the simplest grand P. actions now in use. A is the key, B the lever which raises the

hammer, C the hammer, D the string, and E the damper; F is the button which catches the lever after it has struck the hammer, G the check, H the damper pedal-lifter, I the spring, and K, K, K are rails and sockets.



Formerly, the strings of the P. all were of thin wire; now, the bass-strings are very thick, and coated with a fine coil of copper-wire; and the thickness, strength, and tension of the strings all diminish from the lower to the upper notes. A grand P. has three strings to each of the upper and middle notes, and now, generally, only two to the lower notes, and one to the lowest octave. When the soft pedal is pressed down, the hammers are shifted sideways, so as to strike only two strings instead of three, or one string instead of two.

Besides the grand, the kinds of P. in use are the square, in which the strings are placed still in a horizontal position, but obliquely to the keys; and the upright, in which the strings run vertically from top to bottom of the instrument. The difference in form necessitates alterations in the details of the action, but the general principle is the same. The upright form has been greatly improved and developed in recent years, and has come into increasing favor. The P. as now developed possesses nearly all the powers of expression of any other instrument; on no other except the organ can such complete successions of harmonies be executed; no other represents the orchestra so well, with the advantage that the various parts adapted to it are brought out by the same performer. Its percussive effect has some advantage; but also some disadvantage in its lack of sustained or varied tone after the initial touch; and its temperament is such that without frequent tuning the constant use of the instrument tends to degrade the musical ear. Its popularity, however, is far beyond that of any other musical instrument.

In all large cities of the civilized world are numerous manufacturers of the instrument, employing multitudes of workmen; and in Germany and the United States the manufacture is carried on in many of the secondary towns. Formerly, the German makers adopted a much less perfect action than the English, producing a very different touch and tone; but they are now largely using the English action, which is spreading over the European continent.

The first P. made in America was by Benjamin Crehorn,

of Milton, Mass., 1803. In 1820 Jonas Chickering (q.v.) became associated with James Stewart in the manufacture of pianos in Boston. Apparently the business did not meet expectation, for two years later Stewart returned to England, where he became well known in connection with the house of Collard & Collard. This left Chickering master of the field, and he soon entered on the brilliant series of inventions which did so much for the art of piano-making. The first invention was the full iron frame, in a single casting, applied to grand pianos by Jonas Chickering 1837. It is claimed that an iron frame had been applied by Alpheus Babcock, 1825; but this was a partial iron frame, only in part supporting the tensile pull of the strings. Many minor devices for improving the solidity of the instrument were invented and introduced from time to time, and in connection with them a continual advance was made in solidity, and in volume and singing quality of tone, which by 1851 had reached such perfection that the Chickering pianos shown in the London World's Fair excited profound attention. The volume of tone had been greatly increased by the 'circular' scale, invented 1845. This permitted the strings to be more widely separated than had been possible in the methods of stringing previously in use, and rendered it practicable to employ a heavier hammer, and so became the foundation upon which the later invention of over-stringing was based. The business, continued by the sons, has been enlarged until it is now one of the largest in the world.—Chickering constructed also the first upright piano ever made in America; though the first practicable instrument was by another maker.

Steinway & Sons, having spent the first three years of their American life in various piano factories, in order to master the peculiarities of American instruments and American taste, established their own house in New York 1853, and immediately entered on the career which soon brought them to the highest rank of P.-makers of the whole world. Attention was attracted to their improvements first at the fair of the American Institute in the Crystal Palace, New York, 1855, when they were unanimously awarded the first prize, after an unusually severe test by a committee of judges of exceptional competence. The epoch-making incident of this competition was the exhibition of the 'over-strung' scale, now adopted by all P.-makers. In 1859 the first over-strung grand P. was made; in 1862 the first over-strung upright, on the general line of scale since become universal Several improvements invented by Steinway & Sons have never been adopted by other houses, owing to the impossibility of evading their patents. The most important of these are the 'duplex' scale, strengthening the over-tones, the cupola metal frame, strengthening the resistant powers of the instrument, and various devices to affect the sounding-board and improve the responsiveness of tone. In the direction of power, the Steinways have increased

the tensile pull of the strings from about 20,000 lbs. to more than 60,000 lbs. By general consent their pianos are regarded as superior in tonal capacity to any others made in the world; and their methods are closely copied by the best builders; and to the progress achieved by this house, starting from the inventions of Chickering, the American P. owes its superiority. Nearly all parts of the instrument have been improved by Steinway and Chickering, except one: the strings still remain wound upon steel tuning pins, which retain their tension solely by friction in a wooden wrest plank. A 'patent stringer' has been invented and applied in the pianofortes of Mason & Hamlin, Boston, consisting of a 'set screw,' acting through a raised rim of the metal frame, whereby it is rendered impossible for the pin to slip, the principle being the same as that of the 'patent head' of the guitar and cello, thus remedying all that part of getting out of tune due to the pins slipping. The tone also appears to be bettered by this device.

In its present form, the art of P.-making appears to have nearly reached the limits possible for metal strings struck by felt hammers. The duration of the vibration, as well as its volume and capacity for color, have been enormously developed by American builders within the past half-century. Improvements in the sounding-board have reached a point where the less favorable overtones of the vibrating wire enter into the clang and color it unfavorably.

Among the firms at the head of the list, next to the two pre-eminent ones above mentioned, are those of Decker Brothers and Wm. Knabe & Co. There are also a large number devoted to production of a practical P. at moderate prices, in which large capital finds quick and remunerative returns. The principal centre of P. manufacture still remains at New York, but the tendency is westward.

Music for the P. is written in two staves, and on the treble and bass cleffs. Many of the most eminent musicians have given their efforts largely to composing for it; and some composers of note, e.g., Hummel, Czerny, Kalkbrenner, Chopin, Thalberg, Liszt, and Heller, have almost confined themselves to that instrument.—See Pitch, in Music. See Rimbault, *The Pianoforte* (1860); and Grove's *Dictionary of Music and Musicians.*

PIARISTS, *pī'a-rĭsts*, familiarly Scolopini, or 'Brethren of the Pious Schools': religious congregation for education of the poor, founded at Rome in the last year of the 16th c.—the Pauline Congregation of the Mother of God. The originator was a Spanish priest, Joseph of Calasanza, who, while in Rome, was struck with the imperfect and insufficient character of the prevalent education, even for children of the higher classes, and conceived the idea of organizing a body to meet this want, which the Jesuit Soc. had already partially supplied. The school which he with a few friends opened, rapidly increased in number to 100, and ulti-

mately to 700 pupils; and 1617, the brethren who, under the direction of Joseph, had associated for the work, were approved as a religious congregation by Paul V. (q.v.), who entered warmly into this and other projects of reformation. In 1621 Gregory XV. approved the congregation as a religious order. The constitution of the order was several times modified by successive popes, till the time of Innocent XI. Its field of operations has been confined to European countries; and at present it has communities in Italy, Austria, Spain, Hungary, and Poland. In Italy, during the revolutionary wars, the P. received into their ranks many members of the suppressed Soc. of the Jesuits. In Spain, their establishments were spared, on the general suppression of religious orders 1836. In Poland, 11 houses still were in existence 1832. The number of members in Hungary is said to be about 400, and the order is found also in German and Slavonic parts of the Austro-Hungarian empire.

PIASSABA: see PIASSAVA.

PIASSAVA, *pĭ-ăs'a-vâ*, or PIAS'SABA, or PIAC'ABA [Brazilian name]: remarkable vegetable fibre which, in recent years, has become important. It is procured from Brazil, chiefly through the ports of Para and Maranham; and is produced by one or more species of palm. That which furnishes the greater part is the Coquilla-nut Palm (*Attalea funifera*); but Wallace states that much of it is procured from a species of *Leopoldinia*, which he has named *L. piassaba*. The fibre is produced by the stalks of the large fan-like leaves. When the leaves decay, the petioles or stalks split into bundles of cylindrical fibres of dark-brown color, and hard texture, varying in thickness from that of a horse-hair to that of a small crow-quill. This material has been found of great utility in making coarse brushes, particularly those required to sweep the street; for which purpose they have almost superseded birch-brooms, split whale-bone brushes, and similar implements for scavengers. The coarsest fibres are best for such purposes; the finer are valuable for finer brushes.

PIASTER, n., or PIASTRE, n. *pĭ-ăs'tėr* [F. *piastre*—from It. *piastra*, a thin plate of metal, a dollar: Sp. *piastra:* the word by Skeat is said to be a mere variant of *plaster*]: a silver coin used in Turkey, S. America, Italy, and Spain, of variable value; a Turkish coin now valued at about 2¼*d.*

PIASTRE, *pĭ-ăs'tėr* [Gr. and L. *emplastron*, a plaster; transferred in the Romanic languages to anything spread out or flattened, a plate, a coin]: Spanish silver coin, extensively adopted by other nations. It was formerly divided into 8 silver reals; hence was termed a *piece of eight*, which name was invariably applied to it by the buccaneers of the Spanish Main. The present Spanish P.—commonly known as the *peso duro, peso fuerte,* or, briefly, *duro*—is the standard of the money system, and

is equivalent to about $1.03\frac{1}{3}$ of our money. It is divided into 20 copper reals (*reales de vellon*). In the Levant, the P. is called a *colonnato*, on account of the original coins, struck for use in Spanish America, bearing two columns on the reverse side.—The Italian P., or *scudo*, an evident imitation of the Spanish coin, was exactly equal to it in value.—The P., peso, or dollar in use in Mexico and Cuba, as well as in Chili, Peru, Uruguay, and other S. Amer. states of Spanish origin, have approximately the same value ($97\frac{1}{3}$ cents, or $\$1.01\frac{1}{3}$). The Dollar (q.v.) of the United States was adopted from the Spanish P., but is a fraction less in value, owing, it is said, to an error in the original estimate.—The coin known as the Turkish P. (Turk. *ghūrūsh*) is not an imitation, but an independent national silver coin, which, 1753 was worth about 3*s.* 6*d.* sterling, but has since gradually and rapidly deteriorated, till at the present day it is equal to about $4\frac{4}{10}$ cents of our money.—The Egyptian P. is worth about $3\frac{1}{16}$ cents. Pieces of 2, 5, 10, and 20 piastres are struck in silver, and of 50 and 100 in gold; the piece of 100 piastres being in Egypt the exchange at par for 1£ sterling, or about $\$4.86\frac{2}{3}$.

PIATIGORSK, *pē-â-tē-gŏrsk'* (*Pjätigorsk*): town in Caucasia, Russia, famed for its mineral springs. Though in the centre of a bare and uninteresting plain, its situation on the slope of Mashùka, an isolated mountain more than 3,000 ft. high, gives it an imposing appearance; and the higher parts of the town command a noble panoramic view of Mt. Elburz and the more distant Caucasus. The principal bath-houses are well sheltered, and are cleanly, and comfortably fitted up. Pop. (1889) 13,114.

PIATRA, *pē-â'trâ:* town of Moldavia, 62 m. w.s.w. from Jassy, on a branch of the Sereth. There are paper-mills here. Pop. (1880) 13,890; (1890) 20,000.

PIATT, *pī'at*, Donn: 1819, June 29—1891, Nov. 12; b. Cincinnati. After a partial course at St. Xavier College, he studied law, became judge of the Hamilton co. court 1851, was sec. of legation at Paris, and for nine months, during the illness of his superior, was *chargé d'affaires*. He served through the civil war, enlisting as a private and reaching the rank of colonel. For several years he was the Washington correspondent of the Cincinnati *Commercial*, and afterward founded the *Capital*, in which he violently assailed several of the highest govt. officials. He published *Memoirs of the Men Who Saved the Union* (1887). and was editor of *Belford's Magazine* 1890.

PI'ATT, John James: poet: b. Milton, Ind., 1835, Mar. 1. He worked in a printing-office, afterward took a partial course at Kenyon College, became a contributor to the Louisville *Journal*, and was govt. clerk at Washington 1861–67. Returning to Cincinnati, he was connected with the newspaper press for three years. He then became enrolling clerk of the national house of representatives, and 1871 was appointed its librarian. He became U. S. consul at Cork, Ireland, 1882, and (1890) retains the office. Among his numerous works are *Poems in Sunshine and Firelight* (1866); *Western Windows* (1869); *Landmarks* (1871); *Poems of House and Home* (1878); *Idyls and Lyrics of the Ohio Valley* (1884); *At the Holy Well* (1887).

PIAZZA, n. *pĭ-ăz'zā* [It. *piazza:* Sp. *plaza*, a market-place—from L. *platēă;* Gr. *plateia*, a broad street]: a square; a considerable open space surrounded by buildings; a pathway under a roof supported by pillars or arches; in the *United States*, a veranda.

PIAZZA, *pē-ât'sâ* (fully Piaz'za Armeri'na): town of Sicily, 17 m. e.s.e. from Caltanisetta. The chief trade is in corn, oil, fruits, and other agricultural produce. Pop. 17,000.

PIAZZI, *pē-ât'sē*, Giuseppe: astronomer: 1746, July 16—1826, July 22; b. Ponte in the Valteline. He was received into the order of the Theatins at Milan 1764, and studied in that city, and subsequently in the houses of the same order at Rome and Turin. Summoned to the professorial chair of philosophy at Genoa, he so alarmed the Dominicans by the freedom and boldness of his opinions, that he was removed to Malta, where, 1770, he became prof. of mathematics in the newly-founded university. On the breaking up of this seminary, he returned to Italy, and after teaching philosophy in the Nobles' College at Ravenna, he went to Rome, where he became prof. of dogmatic theology in the institution of San Andrea della Valle. He was transferred 1780 to the chair of mathematics in Palermo, where, with the aid of govt., he established an observatory, which was put in working order 1789. The first results of his observations were, the rectification of some errors in the estimation of the obliquity of the ecliptic, the aberration of light, the length of the tropical year, and the parallax of various heavenly bodies: these results were published 1792. P. had then attained a European reputation, which was heightened by his discovery, on the night of 1801, Jan. 1, of a new planet, the first known of a great group of planetoids between Mars and Jupiter. P. was able only to give a description of it to some of the German and Italian astronomers, when it disappeared; Gauss (q.v.), however, rendered certain the fact of its being a planet. P. named it Ceres, after the ancient goddess of Sicily, to which country he was sincerely attached. In 1803 he published a map of the fixed stars, far superior to any before published, the result of ten years' observations: the work was crowned by the Institute of France.

In 1814, appeared a new and more complete catalogue (containing 7,646 stars), for which he was again rewarded with a prize from the French Institute. He also made researches into the nature of comets, and gave his later years to improvement of public education in Sicily. Besides the catalogues of stars above mentioned, the *Lezioni Elementari di Astronomia* (Palermo 1817) is his chief work. He wrote also many memoirs for the various scientific societies of Europe. P. died at Naples.

PIBCORN, n. *pĭb'kawrn* [W. *pib*, a pipe, and *corn*, a horn]: in *Wales*, a musical instrument consisting of a pipe with a horn at each end.

PIBROCH, n. *pē'brŏk* [Gael. *piobaireachd*, pipe-music—from *piob*, a pipe; *piobair*, a piper]: music played on the Bagpipes (q.v.), which has a wonderful power in exciting the martial instincts and hilarity of the Highlanders. Its rhythm is so wild and irregular, and its notes in the quicker parts so much jumbled together, that a stranger has difficulty in following the modulations or reconciling his ear to them. Its air or ground-theme is called the *urlar;* this is followed by three or four variations; and there is a rapid movement in conclusion. The earliest certain mention of the military music of the bagpipe is at the battle of Balrinnes, 1594; indeed, prior to that period, the bagpipe can hardly be deemed a national instrument of Scotland. There are appropriate pibrochs belonging to various clans and districts, but some of these may not be older than the beginning of the 18th c. One of the oldest known pibrochs is called the 'Battle of Harlaw,' but there is doubt whether it was contemporary with that event (1411). In the ballad account of that battle, there is mention of trumpets and horns, but none of the bagpipe; and the P. style of music has so obvious a relation to the bagpipe (the instrument itself being called P. sometimes in poetry) that it is difficult to suppose that it preceded the use of the bagpipe. According to Sir Walter Scott, the connoisseurs in pipe-music affect to discover in a well-composed P. the imitative sounds of march, conflict, flight, pursuit, and all the current of a heady fight. Many remarkable instances have been recorded of the effect of the P. on the Highlanders. At the battle of Quebec, 1760, Apr. 7, while the British troops were retreating in confusion, the pipers were ordered to strike up a favorite P.; and the Highlanders, who were broken, rallied the moment that they heard the music, and formed with alacrity in the rear.

PICA, n. *pī'kă* [L. *pica*, the painted one, a pie-bird (see PIE 2)]: the Magpie (q.v.): in *med.*, a depraved appetite; an appetite to eat and drink unusual things, e.g., coal, earth, etc. (see MORBID APPETITES): a printing-type of a size used formerly in printing the *pie* or *table* for finding the *service*—supposed to be so called from the appearance of the red or party-colored initial and other letters so numerously interspersed among the black-letter (see PIE 2). See PRINTING.

PICADOR, n. *pĭk′ă-dōr′* [Sp., a bull-fighter]: in *Sp.*, the horseman who begins a bull-fight by attacking the bull with a spear.

PICAMAR, n. *pĭk′ă-mâr* [L. *pix*, pitch; *amārus*, bitter]: a thick, oily, colorless liquid; the bitter principle of tar.

PIC′ARDS: see ADAMITES.

PICARDY, *pĭk′ėr-dĭ* (LA PICARDIE, *lâ pē-kâr-dē′*): ancient province in n. France; bounded w. by the English Channel, and e. by Champagne. The name does not occur till the 13th c. The cap. was Amiens. Its territory now forms the dept. of *Somme*, and portions of the depts. of *Aisne* and *Pas-de-Calais*.

PICAROON, n. *pĭk-ă-rôn′* [Sp. *picaron*, a great rogue —from *picar*, to sting: It. *piccaro*, a beggar, rascal: comp. Gael. *picear*, a rogue, a pilferer: also F. *picorée*, marauding]: a rogue; a plunderer; a robber; a pirate: spelled also PICKEROON.

PICAYUNE, n. *pĭk-ā-ūn′* [from the language of the Caribs]: in the *U. S.*, a small silver coin, value about 6¼ cents.

PICCADIL, n. *pĭk′kă-dĭl*, or PIC′CADIL′LY, n. *-dĭl′lĭ* [OF. *piccadille*]: a high broad-peaked collar or ruff worn in the reign of James I. PICCADIL′LY, n. *-dĭl′lĭ*, a street of London, said to have been built originally by a tailor who had made his fortune by selling piccadillies—hence the name.

PICCAGE, n. *pĭk′kāj* [from Eng. *pick* or *pitch*]: money paid at fairs for liberty to break ground for booths.

PICCANINNY, n. *pĭk′kă-nĭn′nĭ* [Sp. *pequeno*, little, small: It. *piccino*]: a negro baby or child.

PICCINI, *pēt-chē′nē* (or PICCINNI, *pēt-chēn′nē*), NICCOLA: musical composer: 1728–1800, May 7; b. Bari, Italy. He studied music under famous masters at the conservatory in Naples, and brought out his first opera, *Le Donne Dispettose*, 1754. This was well received, and was followed 1760 by *La Cecchina, ossia la Buona Figliuola*, which had a wonderful success in the large European cities. He went to Paris 1766, and produced *Roland*, and several other operas which were very popular. Unfortunately, the managers of the grand opera induced him to enter into direct competition with Gluck (see GLUCK), and each of the composers brought out an opera entitled *Iphigénie en Tauride*. The opera by Gluck proved far superior to that by P., and after less than 20 performances the latter was withdrawn. Removing to Naples 1789, P. produced several successful works; but political troubles and musical rivalries caused him much unhappiness. He spent some time in Venice and Rome, and again went to Paris, where he was enthusiastically received, but was allowed to remain in poverty. Just before his death he was appointed inspector at the national conservatory of music. In less than 22 years he composed many church tunes and more than 130 operas.

PICCOLO, n. *pĭk'kō-lō* [It. little, small]: flute of small dimensions, having the same compass as the ordinary flute, while the notes all sound an octave higher than their notation. In joyous as well as violent passages, this instrument is sometimes very effective in an orchestra.—The name is given also to a small pianoforte; and to an organ-stop of the same musical quality.

PICCOLOMINI, *pĭk-kō-lō'mē-nē*, Ottavio: first Duke of Amalfi, Prince of the Empire: 1599–1656, Aug. 11; fifth in direct descent from Pope Pius II. His family, one of the oldest and most distinguished families of Italy, was originally settled at Rome, afterward removed to Siena, and subsequently obtained possession of the duchy of Amalfi: it has produced numerous celebrated *littérateurs* and warriors, one pope (Pius II.), and several cardinals. He early entered the Spanish military service, and after taking part in the Milanese campaigns, was sent as capt. with a Florentine cavalry regt. to aid Ferdinand II. against the Bohemians. As a cavalry leader, he distinguished himself; and from the regt. of cuirassiers under his command issued the death-dealing bullet to Gustavus Adolphus. In 1634 he was placed under the orders of Wallenstein, who took great liking to him, and confided to him his secret designs against the emperor: P., however, communicated these designs to the emperor, and received, as a reward for his fidelity, a part of Wallenstein's estate. During the remainder of this year, he was actually engaged against the Swedes, and greatly distinguished himself in the first battle of Nordlingen. In the following season he was sent with 20,000 troops to aid the Spaniards in the Netherlands, where the French and Dutch were carrying all before them. P. speedily drove out the French, but his success against the Dutch was not so marked. He was withdrawn by the emperor 1640 to stay the Swedes, who, under Baner, were threatening the hereditary possessions of Austria; and his success against these invaders in Bohemia and the Palatinate, though damped by the defeat inflicted on him in Silesia by Torstensohn, induced the king of Spain to entreat the emperor to send him again to the Netherlands to take the command of the Spanish troops. But his success was not nearly so decisive as before, the prestige of the Spanish infantry having been completely destroyed by the great Condé at Rocroi (1643, May 19). P., however, was again successful against both the French and Dutch till 1648, when he was anew summoned to Germany to encounter the victorious Swedes; but after a brief campaign, the peace of Westphalia (1648) ended his military career. He was created a field-marshal by the emperor, and was sent as plenipotentiary to the Congress of Nuremberg (1649), and soon afterward was raised to the dignity of a prince of the empire. The king of Spain conferred on him the order of the Golden Fleece, and bestowed on him in fief the duchy of Amalfi, which had previously

belonged to his family. P. died at Vienna, leaving no children; his son Max, who figures in Schiller's *Wallenstein*, is only a poetical fiction. His fame as a warrior and general is tarnished by his cruel treatment of a number of Hessian and Luneburger prisoners 1640.

PICHEGRU, *pēsh-grü'*, CHARLES: French general: 1761, Feb. 16—1804, Apr. 15; b. Arbois, dept. of Jura, France. Though of humble parentage, he succeeded in gaining admission to the college of his native town, where, and subsequently at Brienne, he received a thorough education. He was distinguished specially in mathematics, and had some thoughts of teaching as a profession; but the advice of Father Perault induced him to enter an artillery regt. 1783, and he had risen to the rank of a lieut. when the Revolution broke out. P. became an ardent democrat; joined the army of the Rhine, and by his brilliant soldierly qualities soon attracted general attention. In 1793 he became commander-in-chief of the army, and in conjunction with the army of the Moselle under Hoche, repeatedly defeated the Austrians, took from them many important towns, Gemersheim, Speyer, Worms, etc., and established himself in the Palatinate. After the arrest of his coadjutor Hoche, his success at the head of the combined Rhine and Moselle armies was not less decided. The rapidity and boldness of his manouvers, when he took command of the army of the north 1794, disconcerted the allies; and soon they were compelled to retreat beyond the Meuse. After brief respite, P. crossed this river, driving the British before him; and by 1795, Feb., had completed the conquest of the Dutch towns and provinces, ending the campaign by capturing the enemy's fleet (which had been frozen in). He then visited Paris, and while there, suppressed an insurrection of the Faubourgs (1795, Apr.1); but soon afterward returned to the army, which was opposed to the Austrians on the w. frontier, and for some time displayed his usual skill and energy, crossing the Rhine in the face of the enemy,and capturing Mannheim, the chief fortress, on its banks. But the anarchy which he had found at Paris, combined with the flattering promises and bribes held out to him by the Prince of Condé, converted P. into a secret partisan of the Bourbons. The bribes are stated at 'a marshal's baton, the governorship of Alsace, the castle of Chambord, 1,000,000 francs in cash, and 200,000 francs a year.' His remissness, and the unwonted folly and awkwardness of his military manœuvers, though prearranged with the Austrian generals, were not suspected till he suffered himself to be shamefully defeated at Heidelberg, and then retreated, leaving Jourdan (q.v.) without support, thus compelling the latter also to retire. The suspicions of the directory were aroused, and being confirmed by the seizure of P.'s correspondence, he was immediately superseded by Moreau (q.v.), and retired to his native town, where he lived till 1797, when he was elected one of the Council of Five Hundred. He soon became pres.; but

continuing his intrigues with the Bourbons, he was arrested, and subsequently transported to Cayenne. Escaping 1798, June, he made his way to Surinam, whence he sailed for England. He then entered heart and soul into the Bourbon conspiracy with George Cadoudal (q.v.), the two Polignacs, De Rivière, and others, the primary object being the assassination of the first consul. The conspirators secretly reached Paris, and there P. attempted to persuade Moreau, who also was a royalist, to join with them, but without success. But the plans of the conspirators were soon known to the police; and an intimate friend of P., with whom he resided, sold the secret of his retreat to the police for 100,000 crowns. P. was surprised in his sleep, and carried off naked to the Temple, where, a few weeks afterward, he was found, one morning, dead in his bed. The royalists have endeavored to fasten a charge of private assassination on Napoleon; but such a view is untenable, as P. was certain of condemnation and death when brought to trial; and it is generally believed that he strangled himself.

PICHINCHA, *pē-chēn'châ:* extinct or dormant volcano in the w. cordillera of the Andes, in Ecuador, about 10 m. n.w. of Quito. It is of irregular form, 15,924 ft. in height. Around the crater are two other peaks of nearly equal elevation. There have been five eruptions since the Spanish Conquest, the last in 1660. That in 1566 covered Quito with three ft. of ashes and stones. P. was one of the many peaks of the Andes of Ecuador ascended 1879–80 by Edward Whymper.

PICHLER, *pĭch'lĕr*, KAROLINE (GREINER): German novelist: 1769–1843; b. Vienna. In 1796 she published her first work, *Gleichnisse* (1800): other books were followed by *Agāthokles* (1808), perhaps the best of her novels. Later (1811–32) she turned to the patriotic task of popularizing German history. Among her best works of this kind are *Grafen von Hohenberg* (Leip. 1811); *Die Belagerung Wien's von* 1683 (Wien 1824); *Die Schweden in Prag* (Wien 1827); *Henriette von England* (Wien 1832). Of her social novels, most popular are: *Frauenwürde* (Wien 1808); *Die Nebenbuhler* (Wien 1821); *Zeitbilder* (Wien 1840). She died at Vienna. Her dramas were failures, and in her novels there is some tedious diffuseness. Her collected works were pub. in 60 vols., Vienna 1845.

PICK, n. *pĭk* [Dut. *pikken;* Ger. *picken;* F. *piquer*, to pick, to prick: It. *picco*, a beak: L. *picus*, the woodpecker: W. *pigo*, to pick—all having their origin in the imitation of the sound of the blow of a pointed instrument: Gael. *pioc*, a pinch, a nip]: an iron tool pointed, used in digging; choice; selection: V. to pluck, as fruit; to separate with the fingers; to pull off or clean; to select or choose; to take up; to gather; to eat by morsels, as to *pick* a bone; to pierce; to strike with anything pointed; to open by an instrument, as a lock; to strike with the bill; to rob; to do anything nicely or leisurely. PICK'-

ING, imp.: N. the act of plucking, selecting, etc.; a perquisite, usually in the sense of not over-honestly obtained; pounded oyster-shells for gravel-walks; in *OE.*, pilfering; petty stealing. PICKED, pp. *pĭkt:* ADJ. plucked off by the fingers; cleaned by separating with the fingers; opened by an instrument; carefully selected, as *picked* men; in *OE.*, sharp; smart; spruce. PICKED, a. *pĭk'ĕd,* sharp-pointed. PICKER, n. *pĭk'ẽr,* one who picks; in *OE.*, a petty pilferer or thief. PICKAX, or PICKAXE [corrupted from OF. *piquois,* by false analogy with ax]: a digging-tool pointed at the one end and broad at the other, used in excavating. PICK-HAMMER, a pointed hammer for dressing granite. PICKLOCK, an instrument by which locks are opened without the key; a person who picks locks; a superior description of wool. PICKPOCKET and PICKPURSE, one who cunningly steals from the pockets of persons in a public place. PICKERS and STEALERS, in O.E. *slang,* the hands. PICKTHANK, a flatterer; a talebearer; a mean petty informer in order to gain favor. TO PICK OFF, to separate by the fingers; to take away by an unexpected movement, as the life of an enemy in sharp-shooting. TO PICK OUT, to select. TO PICK UP, to gather. TO PICK A BONE WITH ANY ONE, to wrangle; to dispute. TO PICK A HOLE IN ONE'S COAT, to find fault. TO PICK A QUARREL, to get into a quarrel by seeking for it. PICKED OUT, ornamented or relieved with stripes of a different color.

PICK, v. *pĭk:* OE. for PITCH or THROW. PICKER, n. *pĭk'ẽr,* the instrument which throws the shuttle.

PICK, BERNHARD, PH.D., D.D.: American Lutheran clergyman: b. Kempen, Prussia, 1842, Dec. 19. He studied in Berlin and was graduated from the Union Theological Seminary in New York in 1868. He was ordained in the Presbyterian ministry in that year, and held various important charges, but in 1884 joined the Lutheran denomination, in which he has since officiated. He is a learned Hebrew and rabbinical scholar, a contributor to McClintock and Strong's, Schaff-Herzog, and the Jewish encyclopædias; has made numerous translations, and is author of: *Luther as a Hymnist* (1875); *Historical Sketch of the Jews* (1887); *The Talmud: what it is and what it says about Jesus and the Christians* (1887); *The Extra-Canonical Life of Christ* (1903); etc.

PICK-A-PACK or -BACK, ad. *pĭk'ă-păk'* or *-băk'* [Eng. *pitch,* and *pack*]: pitched in manner of a pack; pitched on the back—as to carry a child *pick-a-back.*

PICKENS, *pĭkĕnz,* ANDREW: 1739, Sep. 19—1817, Aug. 17; b. Paxton, Bucks co., Pennsylvania. His ancestors were Huguenots. When 13 years of age he was taken by his parents to South Carolina. He was a member of the expedition led by Col. Grant against the Cherokees 1761, and on his return made his residence at the Long Cane settlement. He was an ardent patriot

and served with great credit through the revolution, entering the army as capt. of militia and reaching the rank of brigadier-general. In 1779 he defeated a greatly superior force under Col. Boyd, and 1781, at the battle of Cowpens, he rallied the militia after it had given way. For gallant service in the latter action he was presented by congress with a sword. He served under Gen. Greene in the campaign of Ninety-six, and commanded a brigade at the battle of Eutaw Springs. He obtained a large tract of land from the Cherokee Indians, and about 1782 settled at Hopewell. Soon after peace was restored, he became a member of the legislature of South Carolina, and by re-elections held this position till 1793, Dec., when he entered congress. He was a member of the convention which adopted the state constitution, was appointed major-general of militia 1795, and on several occasions he was selected to arrange treaties with the Indians of that region. His wife, whom he married 1765, was an aunt of John C. Calhoun. He died in the Pendleton district of South Carolina, which he had obtained from the Indians by the Hopewell treaty.

PICKENS, Francis Wilkinson: American legislator and diplomat: b. Togadoo, S. C., 1805, April 7; d. Edgefield, S. C., 1869, Jan. 25. He was educated at the South Carolina College, admitted to the bar in 1829 and in 1832 elected to the state legislature. He was a member of the Nullification party and an advocate of extreme state rights. In 1834–44 he was a member of Congress, from 1858–60 was United States minister to Russia, and in the latter year was elected governor of South Carolina. He was prominent in the secession movement, demanded the surrender of Fort Sumter and erected the batteries which caused the reduction of that fort. He retired from public life in 1862.

PICKEREL, n. *pĭk'ĕr-ĕl* [from Pike, which see]: a small pike; name of several fish of the pike family: see Pike.

PICKERING, *pĭk'ĕr-ĭng*, Charles: American natural ist and physician; grandson of Timothy Pickering (q.v.): b. Starucca Creek, Pa., 1805, Nov. 10; d. Boston, Mass., 1878, March 17. He was graduated from Harvard in 1823, from its medical department in 1826 and established a practice in Philadelphia. In 1838–42 he was naturalist in the United States Exploring Expedition under Lieutenant Charles Wilkes. In 1843–5 he traveled through Egypt, Arabia, East Africa, and India, engaged in scientific research. He was a prominent member in the leading scientific societies of America and wrote: *The Races of Man and their Geographical Distribution* (1848); *Chronological History of Plants; Man's Record of His Own Existence Illus-*

trated Through Their Names, Uses and Companionship (1879); etc.

PICKERING, EDWARD CHARLES, A.M. PH.D., LL.D., D.SC.: b. Boston, 1846, July 19; great-grandson of Col. Timothy Pickering. He graduated from the Scientific School of Harvard College 1865, was professor of physics at the Massachusetts Institute of Technology 1868–77, and was in the coast survey expedition to Spain to note the eclipse of 1870. He was chosen professor of astronomy at Harvard Univ. 1876, and also director of the Harvard Observatory. He is a member of various scientific societies, has made many important discoveries, and has received several medals from American and foreign scientific societies. He established the first physical laboratory in the United States and was the founder of an auxiliary station in Arequipa, Peru. He has made a specialty of the study of the light and spectra of the stars, and besides various reports of the Harvard Observatory has published: *Elements of Physical Manipulation* (1874–6).

PICK'ERING, JOHN, LL.D.: philologist: 1777, Feb. 7—1846, May 5; b. Salem, Mass.; son of Col. Timothy Pickering. He graduated from Harvard College 1796, studied law, was sec. to the U. S. minister to Portugal, and afterward to the minister to Great Britain. He then practiced law about 25 years in Salem, removed to Boston and was city solicitor 1829–46; served three terms in each house of the Mass. legislature, was a member of the governor's council, and 1833 was one of the commissioners for revising the state laws. He became familiar with many languages and dialects, and was regarded as the principal founder of American comparative philology. He declined professorships in Harvard College, was a member of various learned bodies, and was the first pres. of the American Oriental Soc.; wrote many valuable articles on philology and archeology, and, among other works, published a *Vocabulary of Americanisms*, and a *Greek and English Lexicon* which passed through various editions and was reprinted abroad. He died at Boston.

PICK'ERING, TIMOTHY, LL.D.: 1745, July 17—1829, Jan. 29; b. Salem, Mass. He graduated from Harvard College 1763; after studying law was admitted to the bar, and began practice at Salem 1768; was register of deeds several years, and an officer of militia 1766–76. He commanded a force which made an unsuccessful attempt to capture the British on their retreat from the battle of Lexington; was appointed judge of one of the maritime courts; was a member of the legislature 1776; and toward the close of that year joined the continental army with 700 troops from Essex co., resigned his civil positions, and 1777, June, became adjutant general. He was a member of the board of war, and from 1780, Aug. 5, till the office was abolished 1785, was quarter-

master-general of the army. For a short time he was in mercantile business in Philadelphia, then retired 1787 to the Wyoming valley, where he had a large tract of land; was involved in the political troubles of that region, and was kept a prisoner for three weeks by a gang of masked men. He was the Luzerne co. delegate to the state constitutional convention 1789–90, and in the latter year was appointed by Pres. Washington to negotiate a treaty with the Six Nations, in which mission he was highly successful. He was postmaster-general 1791–95, secretary of war a part of the latter year, and secretary of state 1795–1800. Largely through his influence, the West Point Acad. was founded. On leaving the state department, he retired to Wyoming, where he lived in a log-house. Learning of his financial troubles, friends in Boston purchased part of his land, which placed him in easy circumstances. He returned to Massachusetts, was appointed judge of common pleas court 1802, was elected to the U. S. senate to fill a vacancy 1803, and elected for a six years' term 1804, was an extreme federalist, was defeated for re-election at the close of his term, but was elected representative 1814.

PICKERING, William Henry: American astronomer, brother of E. C. Pickering (q.v.): b. Boston, Mass., 1858, Feb. 15. He was graduated from the Massachusetts Institute of Technology in 1879 and was appointed assistant professor at the Harvard Observatory. He was in charge of the expedition to observe the solar eclipses in Colorado in 1878 and in the West Indies in 1886. He established the Arequipa station in Peru for Harvard College in 1891, led the expedition for the observation of the solar eclipse in Georgia in 1900, and in that year established an astronomical station at Mandeville, Jamaica, W. I. He has published: *Investigations in Astronomical Photography* (1895); *An Atlas of the Moon* (1903); *The Moon* (1903); *Lunar and Hawaiian Physical Features Compared* (1906); etc.

PICKET, n. *pĭk ĕt* [F. *piquet;* OF. *picquet*, a peg, a stake]: a sharp-pointed stake: small number of men placed as a guard of observation at a short distance from the camp of an army: V. to fasten to a picket or stake stuck in the ground, as a horse; to place or post as a guard of observation. Pick'eting, imp. Pick'eted, pp. Inlying pickets, detachments in camp fully equipped, and ready to turn out on an alarm of any kind. Outlying pickets, detachments at some little distance from camp for observation, and to guard against surprises. Picketing, or Picketting, n. *pĭk'ĕt-ĭng*, in a *trade union*, the practice of appointing a small body of their number to watch a shop or manufactory in which the union men are out on strike.

Picket was formerly a military punishment, where the culprit was held by the raised arm in such a position

that his whole weight fell on one foot, which was supported on a picket with a blunt point. The time the man thus stood was proportioned to the offense. The punishment became, after a few moments, extremely painful: it has long been discontinued on sanitary grounds.

PICKETT, *pĭk'ĕt*, GEORGE EDWARD: 1825, Jan. 25—1875, July 30; b. Richmond, Va. He graduated from West Point 1846, was in the war with Mexico and was brevetted lieut. and capt., was afterward promoted capt., and for some years was at Puget Sound, where he rendered important service during the n.w. boundary dispute with Great Britain. 1861, June, he resigned; the following Sep. was appointed col. in the Confederate army, and 1862 was promoted brig.gen. and maj.gen. He distinguished himself in many battles, including those of Gaines's Mill, Gettysburg, and Five Forks; and after the war engaged in the life insurance business. He died at Norfolk.

PICKLE, n. *pĭk'l* [OE. *pikil*, *pykyl;* Dut. *pekel;* Ger. *pökel*, brine]: lye of brine or vinegar used in preserving food: a mess; a disagreeable position; a position of difficulty, embarrassment, or disorder: a troublesome child: V. to preserve or season with salt, vinegar, etc. PICKLES, n. plu. *pĭk'lz*, vegetables or fruit preserved in vinegar, etc. (see below). PICK'LING, imp.: N. the preservation of vegetables or meats in brine, vinegar, etc.; the brine, vinegar, etc., for preserving certain kinds of food. PICKLED, pp. *pĭk'ld:* ADJ. preserved in brine or pickle. A ROD IN PICKLE, a rod soaked in brine to make the punishment more severe—hence, a punishment of any sort held in reserve. PICKLE-HERRING, in *OE.*, a merry-andrew; a buffoon; a jack-pudding.

PICKLE, n. *pĭk'l:* in *Scot.*, a grain of corn; a small quantity. PIGHTEL, n., or PIGHTLE, n. *pī'tĕl*, in *OE.*, a small meadow; any small inclosed piece of land.

PICK'LES: vegetables or parts of vegetables preserved in vinegar; though the term *pickled* is applied also to animal substances, e.g., beef, pork, fish, etc., preserved in salt. The process employed is first to wash the articles intended for pickles in clean cold water; afterward to soak them a few days in a strong solution of salt in water. They are taken out, and, if fruits or roots, dried in a cloth; but if vegetables, e.g., cauliflower, etc., they must be well drained, then placed in the vessels intended to hold them, a few peppercorns, or other suitable spice, being sprinkled in from time to time. When the vessel is about filled, boiling vinegar is poured in until it is quite full; and it is tightly covered. Many persons prefer to boil the spices, of whatever kind used, in the vinegar; and some add the vinegar cold to such vegetables or fruit as are of naturally soft substance; because, except in the case of green walnuts, and one or two other fruits, extreme softness is objectionable in pickles. When the materials to be pickled are naturally

green, e.g., gherkins or small cucumbers, French beans, etc., it is considered very desirable to preserve their color; and this is done sometimes by steeping vine, cabbage, spinach, or parsley leaves in the vinegar—their color being imparted through the vinegar to the pickles. As this requires great care and patience, some dealers resort to very reprehensible methods of coloring their pickles, such as boiling the vinegar in copper vessels, thereby forming an acetate of copper, which is green; or even directly adding that salt to the pickles. Serious results have frequently been produced by this poison.

The principal domestic pickles are the following.—*Cabbage.* Almost always is used the red variety; to this are frequently added slices of beet-root, agreeable in taste, and improving the color. The celebrated Spanish pickle is a mixture of the red cabbage and slices of the large Spanish onion. Sometimes, in the strong desire to improve the color, a little cochineal is added. The spices considered most suitable for pickled cabbage are white and black peppercorns, ginger, and mace. —*Cauliflowers.* Only the flower portion, with its white branches, is used; they are treated as cabbage.—*Gherkins*, or very young cucumbers. These require the same spices as the cabbage; but much care is requisite to keep their green color. This is the familiar household pickle; and there are many special plans for its preparation. A much approved method is to soak the gherkins in a brine of six ounces of salt to the quart of water for 24 hours; then drain or dry in a cloth, place them in jars, and pour in the pickle, composed of vinegar, with an addition to each quart of one ounce salt, a quarter-ounce black peppercorns, one ounce ginger slightly bruised, one or two blades of mace, and a dozen bay-leaves. After soaking two days, they are set on the fire until they simmer, and then replaced in the jars, which must be well corked, and covered with skin, to exclude the air.—*French Beans.* The young green pods are prepared in the same way as gherkins.—*Onions and Eschalots.* These are carefully peeled, and, after two days' steeping in brine, covered with boiling vinegar, to which the spice, usually black peppercorns, has been added. A small variety of onion, called the silver-skin, is generally used.—*Walnuts.* These are gathered green, and so tender that a pin can easily be pushed through them: they are useless when the shell has begun to form. They require at least a week's steeping in the brine. The vinegar must be poured on them boiling hot. The spices used are peppercorns, mace, ginger, and sometimes a little garlic and cloves.—*Mushrooms.* These are sometimes pickled only in brine, and are useful for gravies, etc., in winter. They are also preserved in vinegar; and must be washed in salt and water quickly, and then boiled in the vinegar, to which, besides the spices, a small quantity of salt is added.—*Nasturtiums.* The young green fruit or seeds of the Nasturtium plant, or greater Indian Cress (*Tropæoleum nasturtium*), make

an excellent pickle, an admirable substitute for the foreign capers in sauces for various dishes; and alone are an agreeable pickle.—Several kinds of mixed pickles are made, the chief of which is *Picalilly*, or 'Indian Pickle'—a mixture of cucumber, cauliflowers, etc., with considerable mustard-seed and flour of mustard used as a spice, which gives it a bright yellow color.

Of imported pickles are the unopened buds of the beautiful plant *Capparis spinosa*, called *Capers;* olives, pickled both in brine and in vinegar, but chiefly in brine—both from s. Europe. From tropical countries are every variety of the capsicum—green shoots of bamboo—and the fruit of the mango, in much esteem wherever it is known, notwithstanding a turpentine flavor not agreeable at first. There are numerous other pickles of less importance, almost every soft part of wholesome vegetables being adapted for this mode of preparation. Pickles generally are considered provocatives to appetite; and if made properly and used judiciously, are wholesome and agreeable additions to food.

PICKLOCK, PICKPOCKET, etc.: see under PICK 1.

PICKWICKIAN, a. *pĭk-wĭk'ĭ-an:* pertaining or relating to Mr. Pickwick, the hero of the *Pickwick Papers*, by Charles Dickens: used especially in the phrase, a Pickwickian sense, i.e., a merely technical, parliamentary, or constructive sense: N. a member of the Pickwick Club.

PICNIC, n. *pĭk'nĭk* [Eng. *pick*, to eat by morsels; *nick*, the former familiar name of the tankard for liquor]: *originally*, an entertainment toward which each guest contributed; *now*, a pleasure-party on an excursion into the country, especially when they carry their own provisions, etc., with them; a kind of small sweet biscuit. *Note.*—The *picnic* is pre-eminently an English institution: the F. *pique-nique* is derived from Eng. *picnic*, and not *vice versa: pick* or *pic* simply indicates the informal way of eating the viands; and *nick* or *nic* the OE. familiar name for the tankards from which the liquors were drunk; or perhaps OE. *nick*, a coal-basket or hamper; perhaps, too, *nick*, the proper time, the time chosen: comp. also *knick-knacks*, trifles, indicating for PICNIC the sense, an eating of trifles in a free-and-easy way.

PICO, *pē'k* : one of the Azores Islands, midway between the e. and w. extremities of the group, a few m. s.e. of Fayal. It is 45 m. long, and 5 m. in average width; about 225 sq. m. It is traversed by a volcanic ridge, which rises 7,613 ft. in the Peak (Pico), whence the name of the island. See AZORES. Pop., descendants of Portuguese, about 24,500.

PICO, *pē'ko*, GIOVANNI, DELLA MIRANDOLA: Italian philosopher and theologian, whose genius is inferior to his former reputation: 1463, Feb. 24—1494, Nov. 17; son of the sovereign prince of Mirandola and Concordia. At the age of 14, he was sent to the Univ. of Bologna; and afterward visited the principal schools of Italy and France, everywhere distinguishing himself by his extraordinary facility in mastering the most difficult branches of knowledge. His linguistic acquisitions embraced Latin, Greek, Hebrew, Chaldee, and Arabic, besides Italian and French; he was familiar with the different phases of the scholastic philosophy, and was versed also in mathematics, logic, and physics. At the age of 23, he returned to Rome, when Innocent VIII. was pontiff; and immediately sought an opportunity of showing his learning in the most striking manner, by publicly posting up no fewer than 900 theses or propositions in logic, ethics, physics, mathematics, theology, natural and cabalistic magic, drawn from Latin, Greek, Jewish, and Arabic writers; offering to maintain an argument on each against all the scholars of Europe, and undertaking to pay the expenses of those who came from a distance. P. presumptuously entitled his theses *De Omni Re Scibili* (On Everything That Can Be Known), and Voltaire sarcastically added, *et de quibusdam aliis*. P. had several encounters with notable scholars, and is reported to have come off victorious. But his success was the cause of misfortune. The church appointed a committee to report on the propositions of the young prince, and the result was that several of them were condemned as 'heretical,' though the author was acquitted of any heretical intentions. The handsome and gay young nobleman, a great social favorite, then withdrew from Rome, and settled in Florence, where he austerely gave his whole time to the composition of polemical treatises against Jews and Mohammedans, and to the refutation of judicial astrology. During the last three years of his life, he was growing more devotional and more inclined to religious meditation: he had given to the poor much of his ancestral wealth, and was designing to give up all, and to go through the world preaching Christ, when a sudden fever ended his days at the age of only 31. A complete ed. of his works was pub. Bologna 1496; since frequently reprinted. Among his many writings are *Conclusiones Philosophicæ, Cabalisticæ et Theologicæ* —the famous propositions which excited ferment at Rome. P. is an illustration of the immediate effects produced in literature by the 'revival of letters;' he is full of a specious kind of universal learning, zealous and enthusiastic, but destitute of originality, depth, or creative power. His personal character has always been interesting.

PICOLINE, n. *pĭk'ō-lĭn* [L. *pix* or *pĭcem*, pitch]: an oily volatile liquid having a strong odor and an acrid bitter taste, obtained from coal-tar and naphtha, and present in tobacco.

Picoline is a colorless, mobile, very pungently odorous liquid, with an alkaline reaction and a boiling point of 135° C. The first variety, discovered by Unverdorben, is now distinguished from two other varieties (discovered by Weidel and styled α- and β-picolines) by being called γ-picoline; α-picoline boils at 133.9°, β at 140°, and γ as has been said at 135°. The three are also distinguished by the crystal form of certain of their salts. In modern nomenclature they are styled orthomethylpyridine, metamethylpyridine, and paramethylpyridine respectively. The last of these (the γ-picoline) is very corrosive, with choking vapors; it quiets the excited nerve centres if used as a hypodermic injection.

PICOT, n. *pĭk'ot:* a little loop or lobe used to ornament needle-made laces of all kinds, and often introduced into embroidery.

PICOT, Francois, *frân-swâ pē-kō:* French painter: b. Paris 1786; d. there 1868, March 15. He was a pupil of Vincent and his early reputation was won by his large picture *Cupid and Psyche;* which was followed by *Raphael and La Fornarina;* and an *Evening Landscape.* His *Death of Sapphira,* also an early work, is in the Church of Saint Severin at Paris. The French government purchased for the Luxembourg Gallery his *Orestes Sleeping in the Arms of Electra.* He painted a *Madonna* for the Church of Loretto at Paris, and in the Louvre executed two ceiling pictures, *Egypt and Greece,* and the *Fall of Pompeii and Herculaneum.* His colossal figure of *Christ* in the Church of Saint Vincent de Paul at Paris is in the Byzantine style. He, however, met with much greater success as a teacher of painting than as a painter.

PICOT, Georges, *zhŏrzh pē-kō:* French historian and jurist: b. Paris, France, 1838, Dec. 24. He studied law, was appointed a judge in the Seine tribunal in 1865, and in 1877 accepted a post in the Ministry of Justice. He was editor of *Le Parlement* and in 1878 succeeded Thiers at the Academy of Moral and Political Sciences, where he became permanent secretary in 1896. Among his publications are: *Recherches sur la Mise en Liberté sans Caution* (1863): *Histoire des Etats generaux* (1872); *La Réforme judiciaire* (1881); *Décentralisation et ses différents Aspects* (1897); etc.

PICOTEE, n. *pĭk'ō-tē* [F. *picoté,* pricked, pitted; *picoter,* to tease—from *piquer*]: one of the florist's varieties of *Dian'thus car'yŏphyl'lus,* ord. *Car'yophyllāceæ;* a variety of carnation having the flower-leaves notched and spotted, generally upon a yellow ground. See Carnation.

PICQUART, Georges, *zhŏrzh pē-kär:* French soldier, prominent in 'the Dreyfus case': b. Strasburg, 1854, Sept. 6. He entered St. Cyr in 1872, and after two years there, spent two more in the Ecole d'Etat-major,

from which he was graduated in 1876 with the second rank in his class. From the General Staff School he entered the infantry; became captain in 1880 and major in 1888 upon his return to France from three years in Tonkin; in 1890–3 was professor at the Superior Military School; was promoted lieutenant-colonel in 1896; and in the year before became head of the Department of Information. In May 1896 he obtained possession of a telegram card, the famous *petit bleu*, addressed to Esterhazy, which prompted him to inquire into that officer's record and way of life. The result was that he found Esterhazy's writing was clearly that of the famous bordereau; it was identified as such by Bertillon of the Paris police and by Du Paty de Clam. His investigations were soon interfered with by his superiors; he was disgraced and sent to Tunis, 1896, Nov. 16, the Department of Intelligence being entrusted to Col. Henry, who concealed the truth so far as he could and later committed suicide, when his dishonesty had been disclosed. Picquart, apparently had been sent to Tunis in the hope that he would be killed in battle. This not happening, in May 1897, he was accused of forging the *petit bleu*, which had roused suspicion against Esterhazy. His bold action in repelling this charge hastened the revision of the case. He was retired from the army 1898, February, having been arrested by the military authorities a month before. On July 14 he was again imprisoned in a civil prison, and September 20 was charged with forgery and with tampering with the Esterhazy telegram card. After a long imprisonment in the Cherche-Midi he was released and was the most prominent witness in the Rennes trial of 1899. When the case was retried in June—July 1906, the verdict of the Rennes court-martial was reversed, Dreyfus was declared innocent and restored to the army, and Picquart was acquitted of all charges, subsequently promoted brigadier-general, and in October 1906 became minister of war in the cabinet of M. Clemenceau. See DREYFUS. Consult: Conybeare, *The Dreyfus Case* (1898); de Pressensé, *Un Héros; le Lieutenant-Colonel Piequart* (1898); and Villemar, *Impressions du Cherche-Midi; Essai sur le Colonel G. Picquart* (1899).

PICRA, n. *pĭ'kra* [L., a medicine made of aloes: Gr. *pikra*, an antidote—from *pikros*, sharp, bitter, pungent]: an officinal powder, containing four parts of aloes and one of canella; used in Europe as an electuary, and in America as a cathartic.

PICRIC ACID, *pĭ'krĭk* or *pĭk'rĭk ăs'ĭd* [Gr. *pikros*, bitter or Carbazotic Acid: a symmetric trinitrophenol, with the formula $C_6H_2(NO_2)_3OH$, much used as a dye and in the manufacture of explosives. It was first prepared by Woulfe in 1771 by the action of azotic acid on indigo. To Laurent is due the modern method of preparation, in which phenol and nitric acid are boiled and

concentrated, and the crystallized picric acid in yellow, laminal crystals then separates from the solution; the crystals are not soluble in cold water, slightly so in hot water, and very soluble in alcohol. Other means of preparation are from silk, aloes, benzoin, wool, leather, etc., by action of strong nitric acid. It is an excellent bright yellow dye for animal fibres, and admixtures of blue give beautiful greens. Vegetable fibres, on the other hand, are not colored by it; hence it is used to detect cotton, hemp, or flax in 'woolen' goods. Pharmaceutically it is largely used in France as a soothing antiseptic; a concentrated solution is an excellent cure for burns. But picric acid is not commonly used for dyes nowadays, and its use as an antiseptic has never spread beyond France, but as an explosive it plays a considerable part in the preparation of lyddite and melinite. The acid itself is slightly explosive, much more its picrate of potassium, and the latter was successfully used by Turpin about 1885 in the manufacture of melinite. In general picrate explosives are too liable to explosion to be used in propelling a shell; for the charge of a shell they are very deadly. The ammoniac picrate is used in fireworks. To the theoretical chemist picric acid is a remarkable phenol as being more acid than carbonic acid, probably because of its trinitro-group; this property explains the formation of picrates by the separation of the alkali metals from the carbonates. See EXPLOSIVES.

PICROLITE, n. *pĭk'rō-līt* [Gr. *pigros,* bitter; *lithos,* a stone]: a fibrous variety of the mineral serpentine, of a leek-green color, passing into yellow.

PICROMEL, n. *pĭk'rō-mĕl* [Gr. *pikros,* bitter; *meli,* honey; L. *mel*]: a peculiar sweet-bitter substance found in bile.

PICROMERITE: a monoclinic mineral occurring as crystals and crystalline incrustations. It is found in the crater of Vesuvius, and also in the salt mines of Stassfurt. Compound of hydrous sulphate of magnesium and potassium.

PICROTOXIN, or PICROTOXINE, n. *pĭk'rō-tŏks'ĭn,* or PIC'ROTOX'IA, n. *-ĭ-ă* [Gr. *pikros,* bitter: Gr. *toxĭkon;* L. *toxĭcum,* the poison in which arrows were dipped]: a poison, $C_{30}H_{34}O_{13}$ (or possibly $C_{12}H_{14}O_5$), extracted from the Indian berry, the fruit of the East Indian *Anamirta cocculus* or *paniculata,* by treating with hot alcohol the powdered seed. The alcohol is distilled, the residue boiled with water to which the acetate of lead has been added, and the solution then evaporated. The crystals, white or transparent prisms or rays grouped in star-like forms, are very bitter to the taste, are odorless, inalterable in the air, insoluble in the essential oils, but soluble in cold water (150 times its bulk), boiling water (25 volumes), alcohol (3 volumes), or ether (2½ volumes), and are one of the most violent convulsive

poisons known, closely resembling strychnine in their action. The poison brings death by asphyxiation after severe convulsion, and is bulbo-medullary and not cerebral in its action. Morphine and chloral hydrate are the antidotes, but neither seems to have antidotic force if the original dose is much above the mortal minimum. In therapeutics picrotoxin is practically unused, though it is valuable in epilepsy, chorea, chronic constipation, etc.

PICT, n. *pĭkt* [L. *pictus*, painted]: a person whose body is painted.

PICTET, *pēk-tā*, or *pē-tā*, ADOLPHE: Swiss scholar and linguist: b. Geneva, 1799, Sept. 11; d. there 1875, Dec. 20. He studied in Paris, Scotland, and Germany; in 1838 became professor of æsthetics and philology in the University of Geneva; and wrote *Du Beau dans la Nature, l'Art, et la Poésie* (1856), *Les Origines indo-européennes* (1859–63), and on the relation of Celtic to Sanskrit. He invented a percussion howitzer shell used by the Austrian army.

PICTET, RAOUL: Swiss physicist: b. Geneva, 1842, June. He was professor in Geneva for a time, but now lives in Berlin. In 1877 he liquefied oxygen, nitrogen, and hydrogen; published a memoir on that subject in 1878; and also wrote *Synthèse de la Chaleur* (1879), *Nouvelles Machines frigorifiques* (1885), *Le Matérialisme et le Spiritualisme par la Physique expérimentale* (1896); *L'Acétylène* (1896), and other important monographs, on low temperatures and liquefaction of gases, especially.

PICTON, *pĭk'ton*, SIR THOMAS: English military officer: b. Poyston, Pembrokeshire, Wales, 1758, August; d. Waterloo, Belgium, 1815, June 18. He entered the army at 13, served at Gibraltar, and in 1794 went to the West Indies, where he distinguished himself at St. Lucia, St. Vincent, Martinique, and Trinidad, and in 1797 was appointed governor-general of the last named island. In 1801 he became its civil governor and was promoted brigadier-general. He served in the Peninsular war under Wellington, received rank as lieutenant-general in 1813, was engaged with Ney at Quatre Bras in 1815 and was killed while leading a charge at Waterloo.

PIC'TOR, FABIUS. See FABIUS.

PICTOU, *pĭk-tô:* thriving seaport on the north coast of Nova Scotia, on the northern shore of an ample and perfectly protected harbor, 85 m. in direct line north northeast of Halifax. It is in a fertile and well-cultivated district, with extensive coal mines and quarries of building stone in the vicinity. It exports building stone, dried fish, and potatoes. Commerce is rapidly increasing; ship-building is vigorously carried on. The town was settled in 1763 and occupies the site of an Indian village. Pictou Academy, organized in 1818, is its chief institution. Pop. (1901) 3,235.

PICTS, n. plu. *pĭkts* [AS. *Pihtas* or *Peohtas*, the Picts]: ancient n. British tribe of unknown origin. PICTISH, a. *pĭk'tĭsh*, of or pertaining to the Picts.—The *Picts* were ancient inhabitants of the n.e. provinces of Scotland. Everything connected with the history of the P. has been matter of controversy; and it is not easy to ascertain the truth, where the information given by early writers is so scanty, and where most modern authors seem only to have looked for materials to support a favorite theory.

The 'Picti' of the Romans probably represented a word by which the nation was known in its own language, as well as the barbaric custom to which the well-known expression of Claudian, 'nec falso nomine Pictos,' bears reference. More important is the inquiry regarding the origin and language of the Picts. This, among Scottish antiquaries, has been called emphatically 'the Pictish question;' respecting which the best-known and most amusing, and certainly not the least useful discussion, is that between Jonathan Oldbuck and Sir Arthur Wardour, in the 6th chapter of *The Antiquary*. The disputants can hardly even now be said to be agreed; but the prevailing opinion is, what sound criticism always pointed to, that the P. were a Celtic race—perhaps the first known inhabitants of northern Britain, and (as some hold) to be identified with the Caledonians of the Roman writers. At the time when they became generally spoken of under the name P., they occupied the whole territory n. of the Firth of Forth, except the w. portion, which had been colonized or subdued by the Scots, another Celtic nation, whose chief seat was in Ireland—the proper and ancient Scotland. The s. boundary of the P. was the Roman province of Valentia, embracing the territory between the two Roman walls. At a later period, when Britain was abandoned by its imperial rulers, the boundaries of the various nations occupying the n. part of the island may be traced with considerable distinctness. Making allowance for partial changes at various times, these boundaries may be regarded as the following: The Pictish territory extended along the whole sea-coast from the Firth of Forth to the Pentland Firth. It was bounded w. by the country of the Scots, which extended along the w. coast from the Firth of Clyde to the modern Ross-shire; but the precise line between the two nations cannot be ascertained. The country of the P. was bounded s. by the Firth of Forth and the province of Lothian, then possessed by the English; while the country of the Scots had for its s. boundaries the Firth of Clyde and the kingdom of Cumbria, held by the independent Britons.

The Pictish nation consisted of two great divisions, the Northern and the Southern P., the boundary between them being the mountain range known afterward as the Grampians. These divisions seem to have been ruled at some times by different princes, at other

times by one sovereign. The P. were converted to Christianity at different periods. The Southern P. received the faith from St. Ninian, Bp. of Candida Casa, early in the 5th c. This is mentioned by Bede, and the fact itself has never been doubted; though controversy, as usual, has been busy with the details. The point in dispute is the location of the P. who owed their conversion to Ninian (q.v.). A careful examination of the statements of Venerable Bede, and the fuller but less trustworthy narrative of Ailred of Rievaux, shows that the Southern P., converted by Ninian, had their seat n. of the Forth; that they were, in fact, the great division of the Pictish nation occupying the country between the Firth and the Grampians. The labors of Ninian were carried on and completed by teachers whose names are well known to the readers of ecclesiastical history—Palladius, Serf, Ternan, and others. The Northern P. owed their conversion to a teacher of higher renown—St. Columba (q.v.). The life of that abbot, from his leaving Ireland 563, to his death 597, was chiefly spent in converting the Northern Picts. Their ruler at this time was Brude, son of Mailcon, whom Bede styles a very powerful king. His chief residence was on the banks of the Ness, and there Columba baffled and confuted the heathen Magi in the manner recorded by his biographer Adamnan. It is impossible to ascertain the precise character of the superstitions held by the P. before their conversion. Those whom Adamnan calls Magi are by some modern writers styled Druids, and their religion is said to have been a species of Druidism —whatever that may be held to mean.

Brude, the first Christian king of the P., died 586. Catalogues are preserved, of more or less authority, of the sovereigns who succeeded him. It is impossible to reconcile the discrepancies of these lists, which probably contain the names of princes who reigned at the same time in the n. and s. divisions of the kingdom. The limits of the Pictish territories continued much the same till the middle of the 7th c., when a portion of the s. province was subdued by Oswy, King of Northumbria. In the beginning of the reign of Oswy's son and successor, Egfrid, the P. made an attempt to recover the territory which had been wrested from them. It was unsuccessful; and the power of the English was so firmly established, that the conquered province was erected into a diocese separate from Lindisfarne, the seat of the bishop being fixed at Abercorn. Encouraged by the success which had attended his enterprises, Egfrid seems to have contemplated the subjugation of the whole Pictish kingdom. He advanced northward with his army; Brude, son of Bili, King of the P., retreating before him. The English sovereign passed the Tay, and the P. made a stand at Nechtansmere, supposed to be Dunnichen, in Angus. A conflict ensued; the English were utterly defeated, and their king was slain. The consequences of this battle, 685, May 20, were very im-

portant. The P. recovered the whole territory which they had lost, and even subdued for a time a portion of the proper Northumbrian kingdom.

The next Pictish prince whose name calls for special notice is Nectan, son of Dereli, who succeeded about 710. He cultivated learning to some extent, and aspired to the position of an ecclesiastical reformer. The Pictish Church held precisely the same doctrines as the English; but it differed in various points of ritual, the most important of which related to the proper time of keeping Easter. The king applied for advice to Ceolfrid, Abbot of Jarrow, and the answer, which is addressed 'To the most Excellent Lord, and most Glorious King, Nectan,' is preserved among the works of Venerable Bede. Encouraged by this epistle, he summoned a council of his clergy and nobles, and enjoined them to observe the English usages. The royal command met a ready obedience. He had also applied to the abbot of Jarrow for architects to build a church of stone in the Roman fashion, which he proposed to dedicate to St. Peter. We are told by Bede that the architects were sent, but have no further information on this interesting subject. The plans of the king were probably interrupted by dissensions among his people; and the entire assimilation of the ecclesiastical institutions of northern Britain to those of England was postponed for four centuries.

The most active of all the Pictish sovereigns was Hungus, son of Urgust, who succeeded 730, and reigned 30 years. He was engaged in constant wars with the Scots, the Britons, and the English, in which he was generally victorious. After his death, the kingdom began to decline. The history of its latest period is involved in impenetrable obscurity; all that we know is the final result. Various princes claimed the crown, and held possession of portions of the kingdom. But the most powerful competitor was Kenneth, son of Alpin, King of the Scots, who was descended, in the female line, from the ancient sovereigns of the P., and was probably the true inheritor, according to the peculiar law of succession said to have existed among that nation. Kenneth was acknowledged as king 843, and fixed his residence at Forteviot in Stratherne, cap. of the Pictish kingdom.

A famous passage from Henry of Huntingdon has often been quoted in illustration of the supposed utter destruction of the P., of their princes, their race, and their language. It is referred to in that sense at the close of the following sentences of a work written some time before, but not published till 1864: 'The Pictish vessel is seen in the distant horizon; she approaches rapidly, till you clearly distinguish the crew upon the deck; but before you are near enough to hear their voices, she sinks, the waters close over her, and the wreck never can be raised. The total extinction of the Pictish language renders any further inquiry impossible.

The acumen and criticism of the 19th c. cannot advance beyond the homely wisdom of the 12th c.'—Sir Francis Palgrave's *History of Normandy and England*, iv. 294.

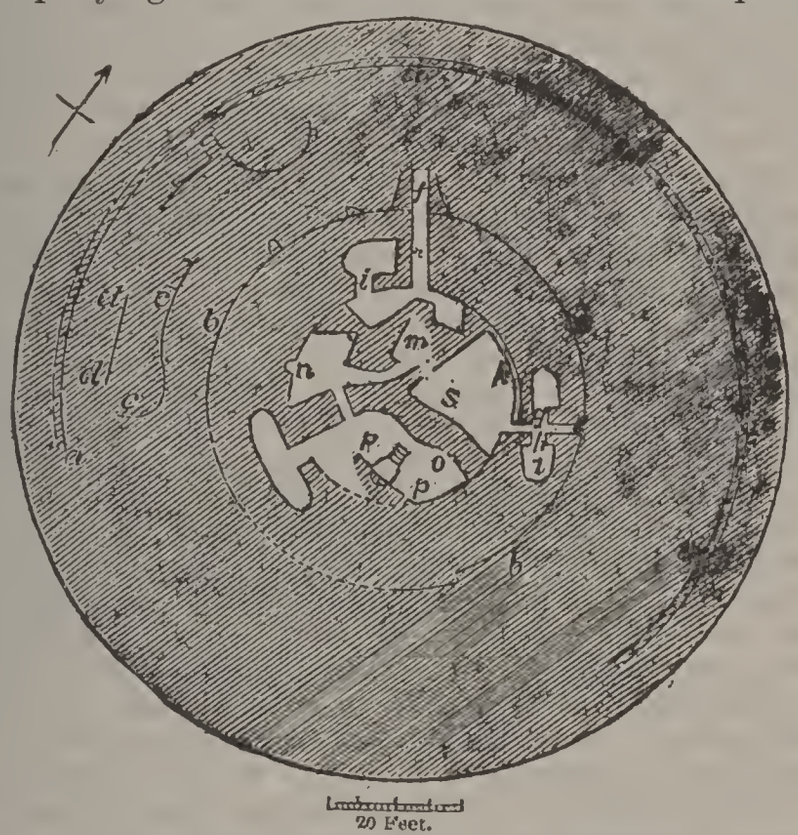
The impression conveyed by such words is erroneous. The Pictish princes still continued to reign in the persons of Kenneth and his descendants. They were kings of the P. in reality and by race, as much as James I. and his successors were kings of England. The princes did not cease in one case more than in the other to be sovereigns of the larger kingdom, because they had previously ruled in the lesser one. Neither did the nation of the P. cease to exist. They dwelt as before in their own land; their old capital was the capital of the new kingdom; and Pictavia is spoken of by the chronicles long after the accession of Kenneth, and long before Scotia became identified with northern Britain, or ceased to be the ordinary name for Ireland. Undoubtedly, through the influence of the kings, and perhaps of the clergy, whom the later Pictish princes had held under oppressive bondage, the Scots became the predominant race, and finally gave their name to the united kingdom and nation. Neither did the language of the P. cease to be spoken. It continued, as before, to be the dialect of the n.e. provinces, till, first in the extreme n., it yielded to the Scandinavian invader, and afterward—more than two centuries subsequently to the accession of Kenneth—it began to recede slowly before the Teutonic tongue of English and Flemish colonists. The same process which destroyed the Celtic language of the Pictish people destroyed the Celtic language also of the British kingdom of Cumbria. Recent ethnologists have, however, suggested that the Picts may, in blood and descent as distinguished from language, have been mainly pre-Celtic and pre-Aryan (see Elton's *Origins of English History*, 1882); and Rhys affirms (*Celtic Britain*, 1883) that the North Picts were Ivernian (Euskarian and non-Aryan) in language also. Skene holds that Pictish 'is not Welsh, neither is it Gaelic; but it is a Gaelic dialect partaking largely of Welsh forms.' More specifically, he holds that Pictish, as compared with Gaelic, was a *Low* dialect—that is, differed from Gaelic in much the same way that Low German differs from High.

The chief ancient authorities for the history of the P. are Adamnan's *Life of St. Columba*, ed. by Dr. Reeves; the *Ecclesiastical History* of Venerable Bede; the *Life of St. Ninian*, by Ailred of Rievaux, in Pinkerton's *Ancient Lives of Scottish Saints;* the Pictish Chronicle, in the appendix to Innes's *Critical Essay on the Ancient Inhabitants of Scotland*, and in the appendix to Pinkerton's *Inquiry into the History of Scotland;* and the *Irish Annals*, ed. by O'Conor. The best modern works on the subject are Innes's *Critical Essay*, and his *Civil and Ecclesiastical History of Scotland;* Pinkerton's *Inquiry;* Chalmers's *Caledonia*, i.; Ritson's *Annals of the Caledonians, Picts, and Scots;* Grub's *Ecclesiastical History of Scotland*, i.; a dissertation in Garnett's *Philological Essays;* and

PICTS' HOUSES.

W. F. Skene in *Four Ancient Books of Wales;* and in *Celtic Scotland* (2 vols. 1875–77).

PICTS' HOUSES: name popularly given in many parts of Scotland to the rude underground constructions, more commonly and accurately called EARTH-HOUSES (q.v.). The name is often given also to a more advanced class of structures of the same kind, found in the more northern counties of Scotland. The ground-plan of one of these at Kettleburn, in Caithness, is figured in the accompanying cut. The outmost circle represents



Pict's House at Kettleburn—Ground-plan.

the extreme limits of the mound which covered the structure; *a*, a bounding wall, three ft. thick, and three ft. high, rudely built of large unshaped stones; *b*, an inner wall, four or five ft. high; *c* and *d*, fragments of walls faced outward; *e* and *f*, passages leading to the inner chambers; *g*, *h*, and *i*, passages leading to smaller side-chambers; *k*, a wall within the wall of the chamber *s*; *m*, a chamber, so ruined that its walls could not be traced all round; *n*, a large bowlder, which, being difficult to remove, had been built over; *o*, a chamber containing a regularly built well (between *p* and *p*), nine ft. deep, and roofed over. The walls were built wholly without mortar. The objects found within them were remains of animals and shell-fish, fragments of pottery, and implements of stone, bone, horn, bronze, and iron. The name of Picts' Houses is also occasionally given in n. Scotland to rude stone structures above ground.

PICTURE, n. *pĭk′tūr* or *-chûr* [L. *pictūra*, a painting—from *pingo*, I paint: It. *pittura;* F. *peinture*, painting, a picture]: any likeness or resemblance made on a flat surface with colors; a drawing; the work of a painter; a representation or description in words; a resemblance: V. to paint a resemblance of in colors; to form an ideal likeness of; to describe in a florid or vivid manner; to portray. PIC′TURING, imp. PIC′TURED, pp. *-chûrd:* ADJ. painted; drawn in colors. PICTORIAL, a. *pĭk-tō′rĭ-ăl*, pertaining to pictures; illustrated by pictures. PICTURE-BOOK, a book for children, illustrated with pictures. PICTURE-FRAME, the ornamental border or case made to contain a picture. PICTURE-GALLERY, rooms set apart for the exhibition of pictures. PICTURE-LINER, one who prepares and fixes the inner canvas of a picture.

PICTURES, COPYRIGHT IN: legal protection of rights of property in pictures, etc.: see COPYRIGHT. In the United States, this right is obtained in the same manner, for the same term, and on the same conditions as copyright in books; the remedy for infringement is also the same.—In Great Britain, the statute law provides that if any one, without consent of the proprietor for the time being, repeat, copy, colorably imitate, or otherwise multiply a copyrighted painting, drawing, or photograph, for sale, hire, exhibition, or distribution, or cause this to be done, or knowingly import or sell, etc., such copies, he shall forfeit to the proprietor of the copyright a sum not exceeding £10, and the copies and materials shall belong to such proprietor. Moreover, if any person affix a mark, monogram, or initials of a person who did not execute or make such work, to painting, drawings, or photographs, or fraudulently sell, exhibit, or offer such for sale, such persons shall forfeit £10, or double the price of the thing sold, etc., and all spurious copies and imitations become forfeited to the real owner.

PICTURESQUE, a. *pĭk′tū-rĕsk′* [F. *pittoresque*—from It. *pittoresco*, picturesque, pictorial—from L. *pictūra*, a picture]: having that striking kind of beauty which impresses the mind on beholding the rough and rugged, or the lovely and the wild, grouped together in nature; striking the mind with great power or pleasure by the natural or artificial grouping of objects; romantic. THE PICTURESQUE, the striking and peculiar beauty in certain groupings of objects. PIC′TURESQUE′LY, ad. *-lĭ.* PIC′TURESQUE′NESS, n. *-nĕs*, the state of being picturesque.

PICUL, n. *pĭk′ŭl:* in *China*, a weight of 100 catties or 1,600 taels, 133⅓ lbs.; also called by the Chinese *tan.*

PI′CUS AND PI′CIDÆ: see WOODPECKER.

PIDDLE, v. *pĭd′l* [prov. Ger. *pitteln*, to meddle with by picking or touching: Norw. *pitla*, to pluck, to pick: comp. Dut. *peuteren*, to pick with the finger: W. *pid*, a point]: to eat here and there a bit; to use the tips of the fingers in doing anything; to do light and trifling work by small touches. PIDDLING, imp. *pĭd′lĭng:* ADJ.

trifling; paltry. *Note.—Piddle* may be the same word as *peddle.*

PIDGIN, *pĭj'ĭn,* CHARLES FELTON: American statistician and novelist: b. Roxbury, Mass., 1844, Nov. 1. He was in mercantile employment in Boston 1863–73 becoming in the latter year chief clerk of the Massachusetts bureau of statistics of labor, and in 1903 chief of the bureau. He has invented several machines for the mechanical tabulation of statistics, among them the electric adding and multiplying machine, addition register, and typewriter tabulator. He has published: *Practical Statistics* (1888); *Quincy Adams Sawyer* and *Mason's Corner Folks* (1900); *Blennerhassett* (1901); *Stephen Holton* (1902); *The Climax* (1902); *The Letter H* (1904); *A Nation's Idol* (1904); *Little Burr* (1905); *Sarah Bernhardt Brown* (1905); *The Corsican Lovers* (1905); *The Hidden Man* (1906); *Theodosia, The First Gentlewoman of Her Time* (1907); etc. He has also composed several musical works, among them *Cambyses,* an opera, and *Peck's Bad Boy,* a comedy.

PIDG'IN ENGLISH. See PIGEON ENGLISH.

PIE, or PYE, n. *pī* [F. *pie,* a daw—from L. *pica,* a flour (dough or paste) with something eatable in it or under it as fruit or meat.

PIE, or PYE, n. *pī* [F. *pie,* a daw—from L. *pica,* a magpie: Skr. *pika,* the Indian cuckoo: comp. Gael. *pigheid,* a magpie (see PICA)]: the magpie; a party-colored bird; a printer's term for any quantity of mixed or unsorted types; the table or index for finding out the service of the day in the old Roman Church Service Book. PIEBALD, a. *pī'bawld* [Gael. *pighe,* a bird; *ball,* a spot: W. *bal,* having a white streak on the forehead, said of the horse]: marked or speckled like a magpie; diversified in color, as, a piebald horse.

PIECE, n. *pēs* [OF. *piece;* F. *piece,* a bit—from mid. L. *petĭum,* a piece: It. *pezza,* a patch, a rag: Sp. *pieza,* a bit of anything: Port. *peça*]: a fragment; a part; a patch; a literary or musical composition; a play; a picture; a coin; a cannon or single firearm; a gun or single part of ordnance; in *her.,* an ordinary or charge: V. to enlarge or mend by putting on or adding a part; to patch; to join. PIEC'ING, imp. mending; making additions; joining two things together; lengthening by addition. PIECED, pp. *pēst.* PIECEWORK, work done and paid for according to its amount. APIECE, ad. *ă-pēs',* one by one; singly. OF A PIECE, of the same sort; alike. PIECEMEAL, a. [OE. *mele;* AS. *mœl,* a portion]: by portions at a time; single: AD. in pieces; in fragments; gradually. PIECE-GOODS, goods usually sold by pieces, as cotton, shirtings, long-cloths, sheetings, etc. PIECE OF EIGHT, a piaster. TO PIECES, to utter ruin. TO PIECE OUT, to extend or enlarge by the addition of one or more pieces.—SYN. of 'piece,' n.: composition; firearm; share; portion.

PIED, a. *pīd* [from Eng. *pie*, a party-colored bird: L. *pica*, the painted one]: variegated with spots or streaks of different color; spotted. PIED'NESS, n. *-nĕs*, the state of being pied.

PIEDIMONTE D'ALIFE, *pē-ā-dē-mon'tā dâ-lē'fā:* town of s. Italy, 20 m. n. by e. of Caserta, at the base of the Appennines. Cotton-mills employ 1,500 hands. There are copper mines in the vicinity. Pop. about 6,000. (Piedimonte is the name of several smaller towns and villages in Italy and Sicily.)

PIEDMONT, *pēd'mŏnt*, or PIEMONT, *pē'mŏnt* [F. *pied*, foot; *mont*, mountain]: former Italian principality, now forming the n.w. part of the kingdom of Italy; inclosed mostly by natural boundaries, having on the n. the Pennine Alps, on the w. the Graian and Cottian Alps, on the s. the Maritime Alps and Genoa, and on the e. the Ticino and the duchy of Parma. Its territory includes the former duchy of Montferrat, which lies in its s.e. corner, what was the Sardinian portion of the old duchy of Milan. Area, 11,750 Eng. sq. m.; pop. (1901) 3,317,401. The mountain ranges which form its boundary on the n., w., and s., attain, in various places, a great elevation above the sea; the Col de Tende, Monte Viso, Mont Cenis, Mont Iseran, Mont Blanc, Mont St. Bernard, Mont Cervin, Monte Rosa, and the Simplon, all being on the boundary-line. As to its general character, the country is partly mountainous, partly hilly, and much diversified with hill and dale; the ranges which traverse the country being spurs from the alpine boundary, and converging toward the central tract, through which flow the Po and its chief tributary, the Tanaro. The valleys which separate these ranges are watered by rivers which take their rise in the Alps, and pour their supplies into either the Po or the Tanaro, according as they come from the n. and w., or from the s. The amount of the water-supply in the country may be imagined when it is considered that in P. the Po receives no fewer than 10 tributaries on the left, and 6 on the right, all of considerable size; and some, e.g., the Tanaro and Dora Baltea, properly classed as rivers. The valleys of the Po and Tanaro are exceedingly fertile, producing abundant crops of grain, pulse, hemp, chestnuts, olives, and many kinds of fruit. Maize and barley are the chief cereals, the former being the ordinary food of the inhabitants; while abundant herds of swine are fed upon the latter. The climate is mild in winter; but in summer, especially on the level country e. of the Dora Baltea and the Tanaro, the heat is scorching, and this portion would be rendered a sandy desert, were it not for the complete system of irrigation, which supplies moisture to more than half a million of acres, and renders the e. districts the granary of the country. So valuable is the privilege of using the water of rivers as a means of irrigation, that a considerable tax is levied on it. The other products of P. are wine and silk, which are very abundant, especially silk,

which is the best in Italy, and is generally exported raw. The chief manufactures are silk, linen, woolen, and cotton goods, hosiery, paper, leather, cutlery, various fermented liquors, glass, and iron. The inhabitants are active and industrious: they belong mostly to the Rom. Cath. religion, but are more tolerant than in other parts of Italy. The Vaudois or Waldenses (q.v.) have from time immemorial inhabited the wild vales at the foot of the Cottian Alps, in the w. corner of the principality. Many of the Piedmontese, like the Swiss and Tyrolese, spend their youth and early manhood in travelling through other countries as dealers in engravings, jewellery, and other articles of merchandise, and, returning with a small hoard, spend the rest of their days in comfort in their native land.

P., in the 10th c., was possessed by the marquises of Susa, Ivrea, Montferrat, and Saluzzo; and it was not till when, a century afterward, the marquisate of Susa passed into the House of Savoy, that the latter, then counts of the Maurienne (the s. portion of Savoy), gained a footing in the country. At the commencement of the 12th c., the possessions of the House of Savoy were divided, and the lines of Savoy and P. formed; but they were again united, 1416, by Amadeus VIII. (afterward Pope Felix V.), who, in the following year, obtained from Emperor Sigismund the title Duke of Savoy, which they exchanged for that of king 1684. During the Spanish War of Succession, P. was increased by the addition of the provinces Alessandria, Valence, Lomellino, and the Val di Sesia (1703), by Tortona and Novara 1735–6, and by Vigevanase and Bobbio 1743. In 1796 it was seized by the French, and parcelled out into six departments, five being incorporated with France, and one with the kingdom of Italy; but after the fall of Napoleon, the House of Savoy recovered possession of it. See ITALY: SARDINIA: SAVOY. Since 1860, the name P., as a provincial designation, has been disused; and P. proper is now divided into the provinces Alessandria, Coni or Cuneo, Novara, and Turin.

PIEDOUCHE, n. *pyā-dôsh′* [F. *piedouche*—from It. *peduccio*, a console, a corbel]: in *arch.*, a bracket or pedestal to support a bust, candelabrum, or other ornament.

PIEDRA BLANCA, *pē-ā′drâ blân′kâ:* town of the Argentine Republic, S. America, 20 m. s. w. from Catamarca. Pop. 10,000.

PIEDROIT, n. *pyā-drwâ′* [F.—from *pied*, a foot; *droit*, straight, right]: in *arch.*, a pier attached to a wall. It has neither cap nor base, and so differs from a pilaster.

PIEGANS, *pē′ganz:* tribe of N. Amer. Indians in Montana, comprising originally two bands on the Marias, Teton, and Missouri rivers. They separated from the Blackfeet during the present century, under their chief, Piegan ('the Pheasant'), from whom their name is derived. Though constantly at war with neighboring tribes, they were generally friendly to the whites. They ceded

their lands to the U. S. govt. 1868, Sep. 1, for $1,000,000, 1874, Apr. 15, their reservation was reduced and their best lands taken. They then numbered about 2,400; but this number has been decreased by disease. Rom. Cath. missions established 1846 have been kept up, but the tribe is under the religious supervision of the Methodists.

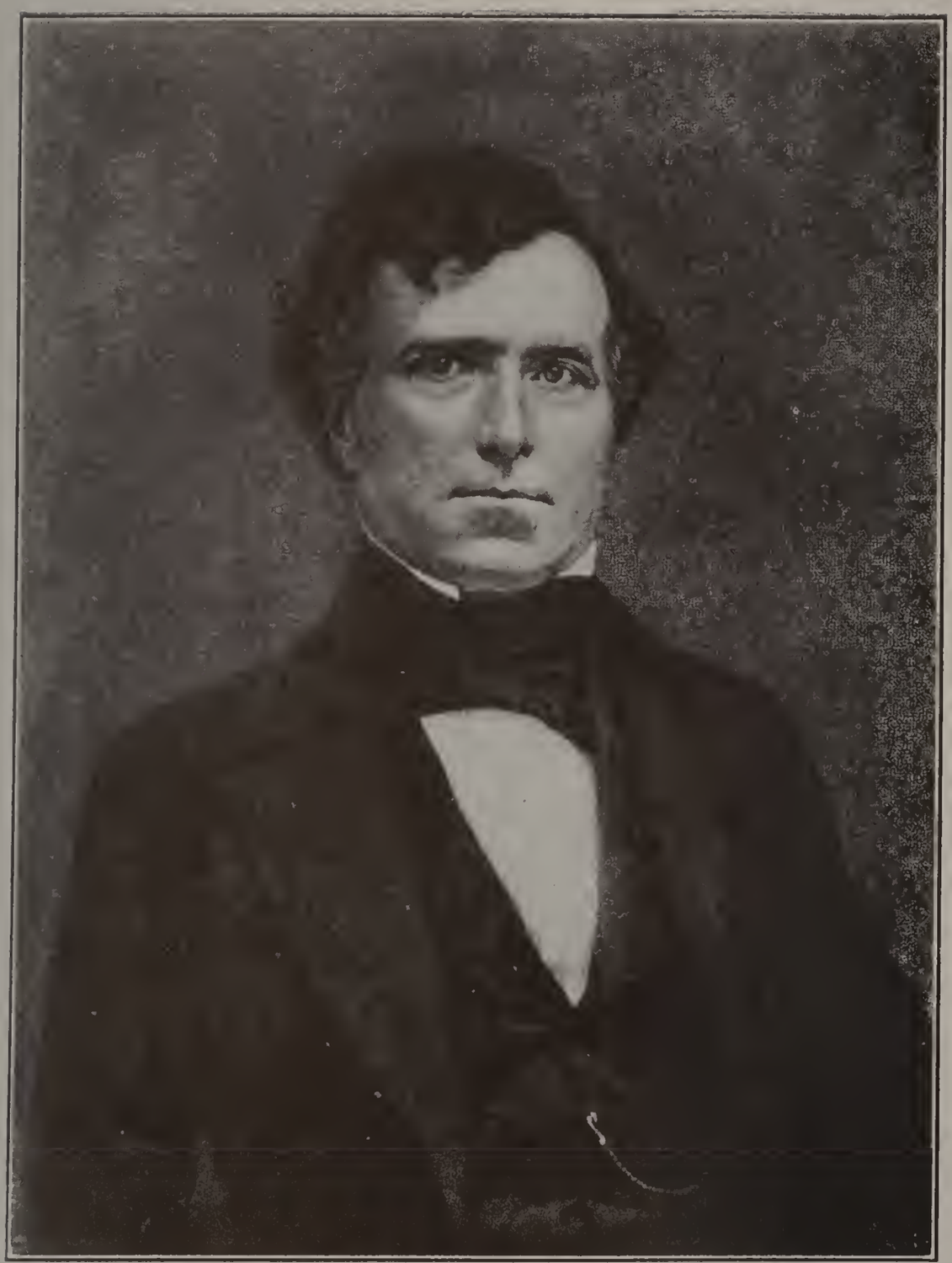
PIELD, a. *pēld:* OE. for PEELED (see PEEL 1); bald; bare.

PIEPOWDER-COURT, *pī'pow-dėr-kōrt* [OF. *pied pouldrè*, dusty-foot—from *pied*, a foot; *pouldrè*, dusty]: in *England*, an ancient court, now long obsolete, held in fairs and markets to administer justice in a rough-and-ready way to all comers; called also the Court of Dusty Foot, from the appearance of the litigants. Its jurisdiction seems to have been confined mostly to petty vagabonds, pedlers, and other wanderers. See PETTY (PETTY SESSIONS).

PIER, n. *pēr* [OE. *pere*, a pier: Dut. *beere*, a pier or mole—from *beuren*, to raise, to lift: Swiss, *büri*, a pier, a wall or mound raised to protect land from the encroachments of water—from *büren*, to raise]: mass of stone or wood work carried out into the sea or other water, and serving as an embankment for the protection of vessels, or as a landing-place; a wharf or landing projecting into a river; the solid stonework that supports an arch of a bridge or other building, of any shape, but not round as a pillar; the solid parts of walls between adjoining doors or windows, etc. The term is applied also to the great Pillars (q.v.) of a church—e.g., 'nave-piers.' PIER GLASS or MIRROR, a glass or mirror hung in the space between windows. PIER-TABLE, a side-table fitted to the space between windows. PIER'AGE, n. *-āj*, toll for using a pier. *Note.*—Skeat derives PIER from OF. *piere*, F. *pierre*, a stone—from L. *petra*, a rock, a stone.

PIERCE, v. *pērs* [F. *percer;* It. *pertugiare*, to pierce]: to enter; to penetrate; to force a way into; to strike; to excite; to touch or affect, as the passions; to affect severely. PIERC'ING, imp.: ADJ. penetrating; boring; sharp; keen; cutting. PIERCED, pp. *pērst*, penetrated; entered by force: in *her.*, term indicating that a charge is perforated to show the field beneath it. The aperture is presumed to be circular, unless some other form—e.g., square-pierced or lozenge-pierced—be specified in the blazon. PIERCER, n. *pērs'ėr*, one who or that which pierces. PIERC'INGLY, ad. PIERC'INGNESS, n. *-nĕs*, the power of piercing or penetrating. PIERCE'ABLE, a. *-ă-bl*, that may be pierced.—SYN. of 'pierce': to force; touch; affect; move.

PIERCE, *pėrss* or *pērss*, BENJAMIN: revolutionary patriot, and gov. of New Hampshire: 1757, Dec. 23—1839, Apr. 1; b. Chelmsford, Mass. He was father of Pres. Franklin P., and his occupation was farming. On the day of the battle of Lexington, he enlisted in the patriot cause, and participated in the battles of Bunker Hill,



FRANKLIN PIERCE.
Fourteenth President of the United States.

Bemis Heights, etc., continuing in service to the end of the war, rising to the rank of capt. and brevet maj.; after the war, brig.gen. of militia. He was mem. of the N. H. legislature 1789–1802; twice councilor; many years high sheriff; and gov. 1827–29. His politics were Jeffersonian and Jacksonian, and he was leader of his party in his state. He d. at Hillsborough, N. H.

PIERCE, *pērss*, FRANKLIN: 14th President of the United States: 1804, Nov. 23—1869, Oct. 8; b. Hillsborough, N. H.; son of Gov. Benjamin P. After preparatory studies at Phillips Exeter Acad., N. H., he entered Bowdoin Coll., in the same class with Longfellow and Hawthorne, and graduated 1824, third in rank. His law studies were under the eminent Levi Woodbury of Portsmouth, and in part under Judge Edmund Parker of Amherst, N. H. He began practice of law in Hillsborough 1827; was a member of the legislature 1829–33, officiating two years as speaker; and was mem. of the national house of representatives 1833–37. His politics, like those of his father, were in opposition to the whig party. In congress he served on the judiciary and other important committees. Of his few speeches, one was against receiving petitions adverse to slavery, another against appropriations to the West Point School. In 1837 he became U. S. senator, youngest in that body; he sustained the war upon the Seminoles of Florida, who gave harbor to fugitive slaves; and denounced the whigs for removing their political opponents from office on the accession of Pres. Harrison. Resigning his senatorship 1842, he resumed the practice of law, in Concord, N. H.; declined a place in the cabinet under Pres. Polk, and a nomination to the governorship of N. H.; and in 1847, first as col., then as brig.gen., took command under Gen. Scott in the invasion of Mexico. Though severely injured by fall of his horse in the battle of Contreras, and fainting with pain at the battle of Churubusco, he refused to retire from active duty in the field. Returning home at the close of the war, he presided 1850 in the constitutional convention of his native state. In 1852 the democratic national convention had for its chief candidates Buchanan, Cass, Douglas, and Marcy: but, failing to unite, Gen. Pierce was nominated and received 282 votes, with 11 scattering; and, at the presidential election, all but 4 states gave him their vote, the whig candidate being Gen. Scott. His inaugural address asserted the constitutionality of slavery and of the fugitive slave law. During his administration, the Missouri compromise was repealed; the territories of Kan. and Neb. organized, with ensuing efforts to establish slavery there; Arizona was acquired as result of boundary dispute; the Pacific r.r. explorations were carried forward; the Commodore Perry treaty with Japan concluded; a treaty made with Gt. Brit. in regard to reciprocity with Canada; and a settlement effected of the fisheries question. In his message, 1856, Jan., he declared the free-state organization of Kan. an act of rebellion. The same

year, Aug., he called an extra session of congress, and the army appropriation bill was passed without the previous house proviso, which was impartial toward the free-state movement. After President Pierce retired from office, he visited Europe. During the Civil war, he spoke in sympathy with the secessionists. He died at Concord. Consult: Bartlett, *The Life of Pierce* (1852); Hawthorne, *Life of Franklin Pierce* (1852); Carroll, *Review of Pierce's Administration* (1856); Irelan, *History of the Life, Administration and Times of Franklin Pierce* (1888); Stoddard, *Franklin Pierce* (in his *Lives of the Presidents*, 1888).

PIERCE, George Foster, D.D.: American Methodist bishop, son of Lovick Pierce (q.v.): b. Greene County, Ga., 1811, Feb. 3; d. near Sparta, Ga., 1884, Sept. 3. He was graduated from Franklin College, Athens, Ga., in 1829, and entered the ministry in 1831. He attained great popularity as a preacher, was president of the Georgia Female Seminary, Macon, Ga., in 1839–42, of Emory College, Oxford, Ga., in 1849–54, and was elected bishop in the latter year. He was a member of the convention which met at Louisville, Ky., in 1846, and organized the Methodist Episcopal Church South, and was prominently connected with it until his death. Consult *Life* by George G. Smith (1888).

PIERCE, Lovick, D.D.: American Methodist clergyman: b. Halifax County, N. C., 1785, March 17; d. Sparta, Ga., 1879, Nov. 9. He entered the Georgia Conference in 1805, was chaplain in the army in the War of 1812, and afterward studied medicine, which he practised until 1821, when he re-entered the ministry. He was prominently connected with the organization of the Methodist Episcopal Church, South, in 1846, and was famous for pulpit eloquence.

PIERCE William: about 1740–1806; b. Ga. He served throughout the revolution, part of the time as aide-de-camp to Gen. Greene, and for brilliant action was presented by congress with a sword. He was a member of the continental congress 1786–7, and of the convention by which the national constitution was framed and adopted; but not being in sympathy with the majority, he withdrew from the meeting, and the famous paper did not receive his signature. His account of the convention has been preserved in the Congressional Library.

PIERIAN, a. *pī-ĕr'ĭ-ăn* [from *Pieria*, a district of Thrace]: pertaining to the Muses. Pier'ides, n. plu. *-dēz*, the nine Muses—from the patronymic termination *ides*, meaning literally *the daughters of* (the district of) *Pieria*.

PIERPONT, *pēr'pont*, Francis Harrison: American politician: b. Monongalia County, Va. (now West Virginia), 1815; d. Pittsburg, Pa., 1899, March 24. He was graduated from Allegheny College, Meadville, Pa.,

in 1839, was admitted to the bar and established a law practice in Fairmount, Va. He was a staunch Whig and Abolitionist and at the outbreak of the Civil war remained loyal to the Union, organized the convention which decided that the western part of Virginia should remain in the Union and was elected governor of the 'Restored Government of Virginia.' He was recognized by President Lincoln, authorized to raise troops for home protection and after serving two years of the unexpired term was re-elected for a term of four years. After the organization of West Virginia as a State and her admission into the Union Governor Pierpont removed his capital to Alexandria and after the evacuation of Richmond transferred the government to that city, where he continued as governor of the loyal section of the State until 1868. In 1868–70 he served in the legislature and afterward was appointed internal revenue collector by President Garfield.

PIERPONT, *pēr'pŏnt*, JOHN: 1785, Apr. 6—1866, Aug. 26; b. Litchfield, Conn. He graduated from Yale College 1804, was a private tutor in South Carolina 1805–09, studied law, began practice 1812, but was led by failing health to engage in mercantile business. He afterward studied theology, and 1819–45 was pastor of the Hollis St. (Unitarian) Church, Boston; pastor of a church in Troy, N. Y., 1845–49, and of a church in Medford, Mass., 1849–56; for a short time in 1861 was chaplain in the army, and afterward a government clerk at Washington. Among his books were *Airs of Palestine*, and a *Digest* of customs, rules, and decisions.

PIERRE, *pē-ār'*: city, capital of Hughes co., and of the state of South Dakota; on the Chicago & Northwestern railroad and the Missouri river; about 120 m. w. of Huron. There are numerous churches; good public schools, a high school; the government Indian Industrial School; McCormick Hall, collegiate institution under Presb. management; a public library and St. Mary's Hospital. There are several banks, and fine hotels. The city owns and operates the gas-works, electric light and power plant and the system of waterworks. Manufactures include bricks and pottery; and there is large trade with the interior of the state. There are several miles of street railroad, a public park of about 80 acres in the heart of the city, and Farm Island (1,500 acres), in the Missouri river, a little below the city, which was given by the United States government for park purposes. Pop. (1910) 3,656.

PIERREPONT, *pēr'pŏnt*, EDWARDS, LL.D., D.C.L.: 1817, Mar. 4—1892, Sep. 23: b. New Haven, Conn. He graduated from Yale College 1837, studied law, and began practice 1840 at Columbus, O. Five years later he settled in New York, and became a judge of the superior court in that city 1857, which office he resigned 1860. With Gen. Dix he was appointed 1862 to try the cases of parties confined in government forts and prisons.

He labored for the re-election of President Lincoln and managed the prosecution of J. H. Surratt for complicity in the assassination of the president. He was attorney-general for the southern district of New York 1869–70, was active in opposition to the Tweed ring in New York, declined the ministry to Russia 1873, was U. S. attorney general 1875–6, and minister to Great Britain 1876–7. He published several orations and wrote largely on financial subjects.

PIERRE'PONT, Hezekiah Beers: shipping-merchant: 1768–1838; b. New Haven, Conn.; grandson of the Rev. James P., pastor of First Chh. (Congl.) New Haven. He was educated for commercial life; was agent for Watson & Greenleaf, Philadelphia, in purchasing the national debt; founded the firm of Leffingwell & Pierrepont, that did extensive business in shipping provisions to France during the French revolution, until Great Britain seized American ships. In 1802 he married a daughter of William Constable, a New York merchant, by whom he became possessed of about 500,000 acres of land in the n. part of New York. Several years after his marriage he bought the Benson farm, in Brooklyn, and lived in that city till his death, applying himself entirely to the cultivation of that estate. The Brooklyn city hall and other public and private buildings were subsequently erected on the site of this farm.

PIERRE'PONT (or Pierpont), James: Congregational minister: 1659–1714, Nov. 14; b. Roxbury, Mass.; son of John P., member of the colonial legislature. He was ancestor of several distinguished men, including Edwards Pierrepont. After graduation at Harvard 1681, he became pastor of the First Church (Congl.) at New Haven, Conn., 1685. He was one of the originators of Yale College, induced Elihu Yale to give to the object, and was a trustee; and he is credited with composition of the 'Saybrook Platform' of the churches. His daughter married the great theologian Jonathan Edwards. He died in New Haven. A sermon by Pierrepont, *Sundry False Hopes Discovered and Decryed,* preached in Boston, was printed 1712.

PIERSON, *pēr'son,* Abraham: 1607–78, Aug. 9; b. Yorkshire, England. He graduated at Cambridge 1632, and was ordained a minister of the established church, but, adopting non-conformist views, emigrated to New England 1639, and joined the First Church in Boston. He became pastor of the church at Southampton, L. I., 1640; but 1647 removed to Branford, Conn., with a few of his people, and there organized a church, of which he was pastor 23 years. He opposed the union of the colonies of Connecticut and New Haven 1662–65, and on its consummation removed with his people out of the colony, 1667, June. They carried away the church records and settled (as the First Church) in Newark, N. J., where Pierson remained till his death.

PIERSON, Abraham: 1641-1707, Mar. 7; b. Lynn, Mass.; son of Abraham P. He graduated at Harvard 1668, was ordained to the ministry the following year, and filled Congl. pastorates at Southampton, L. I., and Branford, Conn. He was his father's colleague at Newark, N. J., and afterward pastor of the Congl. Church, Killingworth, Conn., 1694-1707. He was one of the 10 principal clergymen to found a college in Conn., 1700, and the next year was chosen its first pres. as 'rector of Yale,' holding the office until his death at Killingworth.

PIERSON, Arthur Tappan, D.D.: Presbyterian clergyman: b. New York, 1837, Mar. 6. He graduated at Hamilton College 1857, and first entered the Congregational ministry. In 1863 he became a Presbyterian, and was pastor of several important churches. In 1891-93 he held the pastorate of the Metropolitan Tabernacle, London, and in 1902-3 that of Christ Church, London. For several years he has been editor of the *Missionary Review of the World*, and has published a number of books, dealing largely with missions. They include *The Crisis of Missions* (1886); *Miracles of Missions* (1891); *The Inspired Word* (1890); *Divine Art of Preaching* (1893); *Forward Movements of the Last Half Century* (1900); *The Modern Mission Century* (1901); *The Making of a Sermon* (1904).

PIERS, PLOWMAN, *pērz plow'man*, or rather *The Vision of William concerning Piers the Plowman:* remarkable poem attributed to William Langland or Langeland or Langley, who was born, apparently in Shropshire, England, about the middle of the 14th c., was educated for the priesthood, and died in London near the end of the century. He is thought to have studied at Oxford, and to have been a monk at Malvern. The *Vision*, a powerful poem in vigorous alliterative verse, describes a series of nine dreams, in certain of which a person called Piers the Plowman appears. Its scene is laid in the Malvern Hills, on the Welsh border. The *Vision* exposes and satirizes the manifold corruptions of the state, of the church, and of existing social arrangements. From the 43 MSS. which remain, it is evident that the poem, originally written about 1362, was repeatedly revised, altered and extended, and that it continued to occupy the author all his lifetime.—An imitation is *Piers Plowman's Creede*, about 1390, a Wicliffite work. The best ed. of P. P. is by W. W. Skeat, 1867-77.

PIETÀ, *pē-ā-tâ'* [Italian word signifying *piety*, in the sense of affection for relatives]: name in art for representations of the Virgin Mary embracing the dead body of her son; counterpart to the *Madonna* with the infant Jesus in her arms. One affords a representation of the purest joy and highest motherly love; the other, of the utmost pain and grief.

PIETISM, *pī'ĕ-tĭzm:* interesting and powerful religious movement in the Lutheran Church in Germany, during the last part of the 17th and first half of the 18th c. The term Pietists designates a religious party which, without forming a separate sect, had distinctive characteristics in opinion and in procedure. It is still applied to the same or like tendencies of opinion, feeling, and conduct. P. may be regarded as consisting in an exaltation of the importance of religious feeling and of godly practice, with a corresponding depreciation of doctrinal differences that do not concern the simple fundamental Christianity; and with a contempt for, or, at best, respectful indifference to, outward ecclesiastical arrangements. P. has been more or less strongly developed from time to time in all sections of the church; as the tendency toward it always exists in a large class of earnestly religious minds. This tendency has taken sometimes a disproportionate development. In the church of the middle ages, it was displayed in an endeavor to attain superior spirituality and purity by religious contemplation and asceticism, and many persons, consequently, embraced a monastic life. The Reformers, adopting the Augustinian doctrines, rejected this external mode of seeking deliverance from indwelling sin, and proclaimed the efficacy of faith in the sacrifice of Christ. But the controversies which arose among them, and increased among their successors, gradually gave a too exclusively doctrinal and polemical character to the sermons and writings both of the Lutheran and of the Calvinistic divines, particularly in Germany; and a reaction ensued, not at all toward the Church of Rome, but in favor of a religion of pious feeling and good works, or of the heart and life. Disgust at the sectarian bitterness and exclusiveness which prevailed led even to an undervaluing of disputed points; thus the *Pietism* of Germany was generated and developed. Its origin is referred to a work, *Vom wahren Christenthume*, by John Arnd, 1605; to the *Invitatio Fraternitatis Christi* of John Val. Andreæ, 1617, both Lutherans; and to the writings of Cocceius, a Calvinist. But its fuller development was due unquestionably to Spener (q.v.), in the latter part of the 17th c., and to his friends and disciples. The name *Pietists* was given first in contempt to certain young *docents* in Leipzig, who began 1689 to give prelections on the New Test. both to students and to citizens, and to addict themselves to a meditative mode of life. Spener had held meetings somewhat similar in his own house when preacher at Frankfurt-on-the-Main, and in his writings had urged the necessity of a reform in the Prot. Church and theology. He and his followers dwelt much on the importance of studying the Scriptures rather than the symbolical books, on the unfitness of any unconverted or unregenerate person for the Christian ministry, on the right and duty of the laity to take part in the exercises of Christian assemblies, and on the necessity of a practical religion rather than a systematized doctrine. But

many of the extreme Pietists carried their antipathy to the doctrinalism and the established services of the church to a degree that alarmed the theologians of the old school, the 'high and dry' Lutherans, or German 'moderates,' who accused Spener and his disciples, not entirely without reason, of a tendency to make all goodness and virtue consist in mere religious feeling, or pious sentimentalism; to represent the Divine grace as operating in too sudden and abrupt a manner; to exaggerate the value of good works; to depreciate the value of learning and of clear intellectual perception in the study of Scripture; and to indulge in a strictness of judgment on the religious character of the ordained clergy, tending to sectarianism, and indeed incompatible with ecclesiastical unity. The weapons of argument, however, were not the only weapons employed against the pietists. The docents were compelled to give up their prelections, and finally to leave Leipzig; the meetings for mutual edification were suppressed by the government as disorderly conventicles; and Francke (q.v.), most distinguished of the Leipzig docents, having gone to Erfurt, was prevented from lecturing, and quickly compelled to retire. Spener's influence, however, procured a refuge for his friends in the newly founded Univ. of Halle, and Francke obtained a professorship there. Halle became thenceforth the source of new religious influences—indeed, of a new religious life to Germany. The Pietists, though spiritually exclusive—disposed to regard themselves as the 'chosen of God,' and to look down on all others as 'children of the world,' or even of the devil—did not attempt to form a separate sect. To do them justice, they were as far as possible from being ecclesiastically ambitious; all their desire was to excel in 'labors of love,' and to cultivate a disposition of intensest piety. The rise of the Wolfian or Rationalistic theology, the spread of that sort of skeptical anti-clerical philosophy which flourished for a while under the name *Aufklärung* (Enlightenment), exercised an injurious and depressing influence on P.; yet through all the long, obstinate warfare maintained against the doctrines of the church by the Rationalists, during the last half of the 18th and the most of the 19th c., P. continued to have adherents; and it is to the Pietists, and not to the dogmatists, that Germany is in great measure indebted for that revival of religious faith and feeling which, beginning with the great Schleiermacher—himself trained under pietistic influences—has since widely affected German biblical scholars and theologians. The patriotic enthusiam called forth by the insolent conquests of the French naturally allied itself to pietistic tendencies; for in Germany, the triumphs of Napoleon even as *emperor* were viewed as the triumphs of revolutionary, republican, and infidel principles; and after the general restoration of peace, the statesmen and upper classes, especially in Prussia, believing that political security could be obtained only by a return of the populace to the simple

obedient, and unquestioning piety of earlier times, countenanced this party in the church; and amiable tea-drinking societies of devout men and women were formed to distribute tracts, and to inoculate the radical and heathen masses with pietistic sentiments. But this attempt to use 'piety' for reactionary political purposes sullied its purity, and alienated from it the very parties which it sought to influence. Still, P. exists as a distinct element in the religious life of Germany; and now, as ever, its strongholds are Prussia (Berlin, Silesia, Wupperthal), Hesse, and Würtemberg. In Britain and America it is recognizable as a religious element of great though unknown force.

PIETRA-DURA, n. *pē-ĕt′rā-dū′rā* [It. *pietra*, stone; *duro*, hard]: name of the finest kinds of Florentine mosaic-work, in which the inlaid materials are hard stones, e.g., jasper, carnelian, amethyst, agate, etc. The real P.-D. work dates as far back as the 16th c., about 1570; and from that time to the present, has been almost confined to Florence, where a govt. *atélier* has existed ever since the beginning of the 17th c., which was originated to supply decorations for the Capella Medicea. It is called sometimes *Pietre Commesse*, and Lavoro di Commesso. In the inferior kinds, sold in Italy, and manufactured now extensively in Derbyshire and other parts of Britain, pieces of colored sea-shells are used instead of the harder and more valuable colored stones.

PIETRAPERZIA, *pē-ā′trâ-pĕrd′zē-â:* town of Sicily, six m. s.e. from Caltanisetta, on a lofty height. Pop. 10,000.

PIETRASANTA, *pē-ā-trâ-sân′tâ:* town in Italy, two m. from the Mediterranean, 17 m. from Pisa, 20 m. n.w of Lucca. It is in a fertile country in which the olive and the vine are largely cultivated, has a massive citadel and is heavily walled. The streets are well laid out, and there are several public squares. Many of the buildings are old but are well preserved. Pop., including the commune, about 13,500.

PIETY, n. *pī′ĕ-tĭ* [F. *piété*—from L. *piĕtas*, piety—from *pĭus*, devout, pious: It. *pieta*, piety]: constant sense of dependence on the Supreme Being, attended with love and reverence of Him, and a disposition to know and obey His will; reverence of parents and obedience to them, with a constant effort to preserve their honor and promote their happiness—called also FILIAL PIETY. PI′ETIST, n. *-tĭst*, name applied to a sect in Germany toward the end of the 17th c. (see PIETISM, above): the term is applied sometimes (still, often as at first), in a derogatory sense, to an emotional Christian. PI′ETISM, n. *-tĭzm*, practices or teachings of the Pietists (see above). PIETIS′TIC, a. *-tĭs′tĭk*, of or pertaining to the Pietists: in a derogatory sense, affectedly religious.

PIEZOMETER, n. *pī′ĕ-zŏm′ĕ-tėr* [Gr. *pĭĕz′ō*, I press; *metron*, a measure]: instrument for measuring the compressibility of fluids. Oersted's (q.v.) instrument, the first by which the compressibility of water was satisfactorily determined, consisted of a cylindrical glass jar, into the neck of which a narrower cylindrical tube of glass, open at both ends, was firmly fixed. In this tube worked an air-tight piston by means of a screw. In the interior of the jar was placed a bottle, whose neck was drawn out into a long capillary graduated tube, and alongside this bottle was suspended a cylindrical tube, closed at the top, but open at the bottom. When the compressibility of any liquid was to be determined, the instrument was adjusted in the following manner: the bottle inside was filled almost to the top of the capillary tube with the fluid, and being replaced inside the jar, the latter was completely filled with water up to the piston in the neck. The liquid in the submerged bottle, then under pressure of the water above it, fell slightly in the capillary tube, being kept from contact with the water by an air-bubble, the motion of which up or down, according as the pressure was less or greater, served as an index showing the graduation. The suspended tube alongside being at first filled only with air, the water rose in it to some extent, and by graduations on the tube it was made to indicate the pressure in atmospheres or parts of atmospheres. Pressure was then applied to the water in the jar by screwing down the piston; the compressed water communicated the pressure to the liquid in the bottle and to the air in the suspended tube; the descent of the air-bubble in the former indicating the amount of diminution in bulk that the liquid had undergone (the capillary tube being graduated in inches and parts of inches, and each inch of tube being known to contain a certain fraction of the contents of the bottle), while the ascent of the water in the suspended tube showed the amount of pressure which had been applied.

PIFFARO, n. *pĭf′ėr-ō*, or PIFFERO, n. *pĭf′ėr-ō* [It., a fife]: the old form of the oboe, still in use in some districts of Italy and the Tyrol; a rude kind of bagpipe with an inflated sheepskin for the reservoir, common in Italy, and seen occasionally in the streets of London.

PIG, n. *pĭg* [Dut. *bigge* or *big*, a pig: perhaps connected with Gael. *big*, little ones—from *beag*, little: Icel. *pika*, a girl]: the young of the sow kind; a name applied generally to swine (see HOG): one of the oblong masses of cast-iron as first extracted from the ore, and run from the smelting-furnace into rough molds made in a bed of sand—the larger oblong masses being called sows: V. to farrow or bring forth pigs; to herd or live together like pigs. PIG′GING, imp. PIGGED, pp. *pĭgd*. PIGGERY, n. *pĭg′ėr-ĭ*, a place where pigsties are erected and pigs kept. PIG′GISH, a. *-ĭsh*, like pigs. PIG-FACE, n. *-fās*, an Australian fruit having a sweetish and saline pulp. PIG-FACED, a. *-fāst*, having a face resembling that of a pig. PIG-HEADED, a. *-hĕd′ĕd*, stupidly obstinate. PIG-HEAD′EDNESS, n. the quality of being stupid and obstinate. PIG-IRON, cast-iron as first extracted from the ore in pigs. PIG-NUT, the ground-nut, the bulbous root of the plant *Bunĭŭm*, ord. *Umbellifĕræ:* also, a species of Hickory (q.v.). PIG-RAT (see BANDICOOT). PIGSTY, a pen or hut for pigs. PIGTAIL, a long twist of hair falling down from the back of the head; tobacco twisted in small rolls. TO BUY A PIG IN A POKE, to make a purchase foolishly and without examination.

PIG, n. *pĭg* [Gael. *pige*, an earthen jar]: in *Scot.*, an earthen jar; a flower-pot. PIGS, n. plu. *pĭgz*, earthenware articles. PIG-WIFE, a woman who sells crockery. PIGGIN, n. *pĭg′ĭn* [Gael. *pigean*, a little earthen jar, a pot: Ir. *pigin*, a small pail: W. *picyn*, a piggin]: in *OE.*, a small vessel with a handle for holding liquids, generally of small wooden staves bound with hoops like a pail.

PIGEON, n. *pĭj′ŭn* [F. *pigeon*—from L. *pipĭōnem*, a young chirping bird—from *pipĭo*, I peep like a chicken: It. *pippione* or *piccione*, a young dove, a silly gull: Sp. *pichon;* Gael. *pighe*, a bird]: well-known bird of many varieties; the dove (see below): a simpleton; a person taken in by gamblers. PIGEON-BERRY (see PHYTOLACCA). PIGEON ENGLISH [*pigeon* or *pidgin* is said to be the Chinese corruption of *business*]: business English or talk; the absurd jargon of English used by those speaking English in their dealings with the native Chinese. PIGEON-HEARTED, a. timid; frightened. PIGEON-EXPRESS, intelligence transmitted by a written slip attached to a carrier-pigeon. PIGEON-FOOT, a plant. PIGEON-HOLE, the opening to the nest of a pigeon; in a *case* or *box frame*, one of a number of small openings for the storing of papers, letters, etc. PIGEON-HOUSE, a dove-cote. PIGEON-LIVERED, mild; soft; gentle.

PIGEON: name sometimes applied, like Dove (q.v.), to all the species of *Columbidæ* (q.v.), and sometimes almost restricted to those still included by ornithologists in the genus *Columba;* having a bill of moderate length, hard, and a little arched at the point, the base of the upper mandible covered with a soft thick skin, in which the nostrils are pierced; the feet with toes divided to the base, and formed both for walking and perching; the wings rather large and pointed; the tail of moderate length, and generally square at the end. The species of this group are numerous, and occur in almost all parts of the world. Some build their nests in trees, and some in holes of rocks; they lay only two eggs at a time, but breed twice or oftener in a year, and both the male and the female take part in incubation.

The United States species are made by systemizers to be of just as many genera as species. They are the Wild Pigeon (*Ectopistes migratorius*), length 15–17 in., wandering everywhere; the Carolina Dove (*Zenœdura Carolinensis*), 11–13 in., brownish-olive, bluish on crown and nape, purplish-red beneath, gilded neck, black spot on ear and wing coverts—abundant in temperate N. Amer.; the Zenaida Dove (*Zenaida amabilis*), 10 in., olive-gray with reddish tinge, crown and under parts wine-red—W. Indies and Flor. Keys; the White-winged Dove (*Melopeleia leucoptera*), 11–12 in., like Carolina Dove, but with broad white bar on wing and end of tail—s.w. and s.; the Ground Dove (*Chamæpeleia passerina*), only 6–6½ in.—s. United States to the Pacific, mostly coastwise; Scaly Dove (*Scardafella squamosa*), 8 in., like Ground Dove, but having body feathers with dark border, whence the name—s.w.; Key West Dove (*Geotrygon Martinica*), 11 in., white stripe below eyes and on throat—Key West (and W. Indies); Blue-headed Ground D. (*Starnœnas cyanocephala*), 11 in., structure and habits gallinaceous—same localities as the preceding; Band-tailed P. (*Columba fasciata*), 15 in.—Rocky Mts. to the Pacific. In Mexico, there is the Red-billed P. (*C. flavirostris*), 14 in. The White-headed P. (*C. leucocephala*) of the W. Indies is found also on the Florida Keys. The great centre of the Columbidæ is the Papuan region of the E. Indian archipelago, especially New Guinea; in that vicinity are ¼ of the species, 118; India 28; Australia 23; Africa 40; in both Americas not more than 80. The king of the family is the large Crowned P. 27 in., of the Papuan group. Among the most variously and highly colored are the fruit-eating pigeons of the E. Indies and Australia.

The original of all the varieties of the DOMESTIC P. is now almost universally believed to be the ROCK-P. or ROCK-DOVE (*C. livia*), the *Biset* of the French, a bird of extensive geographical range, found as far n. as the Faröe Islands, and on many parts of the coasts of Europe, Asia as far as Japan, and n. Africa, breeding in crevices of rocks, and often within caverns which open on the sea. It swarms in prodigious numbers in some rocky

islands of the Mediterranean; and even on the British coasts, great numbers are found in some localities, particularly in the Orkneys and Hebrides. Its food consists partly of mollusks and other small animals, partly of grain and seeds; and it often makes unwelcome visits to the corn-fields of its vicinity. In a wild state, this bird has great uniformity of both size and plumage; being not quite 12 inches in length from tip of bill to end of tail; prevailing color bluish-gray, in some parts with green and purple reflections, two broad and distinct bars of black across the closed wings; lower part of the back white; tail deep gray, with a broad black bar at the end; bill blackish-brown; legs and toes reddish-orange.—Until recently, naturalists generally confounded this species with the STOCK-DOVE or SMALLER WOOD-P. (*C. œnas*),

1, Ring-dove, Cushat, or Wood-pigeon; 2, Biset, or Wild Rock-pigeon; 3, Collared Turtle.

a species which inhabits woods, and whose geographical range is the same as that of the ring-dove.—The RING-DOVE, WOOD-P., or CUSHAT (*C. palumbus*), is the most common British species, and is diffused over great part of Europe, temperate Asia, and n. Africa. The RING-TAIL P. (*C. Caribbea*) is a W. Indian species, valued for the richness and delicacy of its flesh, reckoned one of the great luxuries of that part of the world.

Only one species of P. has been truly domesticated, and having long been so, it has undergone many remarkable changes, and there are numerous varieties or

breeds; some, exhibiting very strange peculiarities, and known as *fancy pigeons*, being carefully preserved and tended by pigeon-fanciers. Pigeon-fancying is nowhere carried further than in London. The prices of such fancy pigeons as are deemed most perfect of their kind, are very high. The ordinary domestic pigeons, kept for profit as a kind of poultry, differ from the wild rock-dove chiefly in color, in which they are often very unlike it, though a tendency always manifests itself to return to the original colors, and the bars on the wings are apt to reappear in the progeny even of what may be called the most artificial varieties. Of these, among the most interesting are the Rough-footed P., having the feet feathered; the Jacobin, which has a range of feathers inverted over the head and extending down each side of the neck as a hood; the Fan-tail or Fan-tailed Shaker, in which the number of the tail-feathers is greatly increased, and the bird has the power of erecting its tail like that of a turkey-cock, while it has also a peculiar vibratory motion; the Tumbler, so called from tumbling in the air in its flight, and further characterized by a very short bill; and the Pouter or Cropper, which has the power of blowing up its crop to an extraordinary degree, so that the head seems fastened on the top of an inflated bladder. The Carrier P. (q.v.) is regarded as a variety of the Common Pigeon. There are 150 tame races of the domestic P. that breed true, besides some wild races in Egypt and Asia, with separate names.

For the profitable keeping of pigeons, it is necessary to have a properly-constructed dovecote, divided into cells, a cell for each pair, each cell 16 inches broad, by 12 from front to back, and the door toward one side, so that the nest may not be seen from without; a slip of wood in front of each cell for the birds to sit and coo on. The dovecote must be placed at such height as to be out of the way of rats and other depredators; and must be frequently cleaned, otherwise it may probably be deserted by its occupants. It ought to be painted white, that color being very attractive to pigeons, and lessening the difficulty of retaining them when a new dovecote is established. Pigeons begin to breed at the age of nine months, and breed every month except in very cold weather. The male and female continue faithful to each other from year to year—a circumstance noted by Pliny and others of the ancients, and evidently, as well as their somewhat demonstratively manifested affection, a reason of the poetic references often made to the dove.

PIG'EON COVE: village, Rockport tp., Essex co., Mass.; on the shore of the Atlantic Ocean, at the extreme point of Cape Ann (q.v.), about 33 m. n.e. from Boston, 2 m. from the village of Rockport, which is reached by the Boston and Maine railroad. Its little harbor is like a cup among the rocks. Its picturesque location and impressive rocky shore, with its ocean air, make it a favorite summer resort, and beside the early fishing-village, a village of hotels and cottages has sprung up. A fine quality of granite is quarried here.

PIG'EON (or PIDG'IN) ENGLISH [pigeon or pidgin doubtless from the Chinese pronunciation of 'business']: business-English; peculiar dialect used principally for commercial purposes as a means of intercourse between the natives and foreigners in China. The English, Portuguese, and Hindustanee tongues are represented in it; but it is extremely limited in range and nearly all the words used are either nouns or verbs, without proper inflection or grammatical construction. Though neither a written nor a printed dialect, and at best a miserable makeshift, there are a few schools in China in which it is taught, and a large part of the foreign business of the empire is transacted by its means.

PIGEON-HAWK: name applied to two birds: 1, *Falco columbarius*, its genus having the bill provided with a sharp tooth and notch in the upper mandible and a notch in the lower; its group, with tarsus having a double row of enlarged plates in front; in this species, the under parts are whitish on throat and yellowish below, streaked longitudinally with brown: a spirited little falcon.—2, The SHARP-SHINNED HAWK, *F. fuscus*, like the preceding in size (12–13 in.) and in slate-color above (female and young of 1, dark above; young of 2, brown above), but barred crosswise below, except the young, lengthwise.

PIGEON PEA (*Cajanus*): genus of plants of nat. order *Leguminosæ*, sub-order *Papilionaceæ*, of which, according to some botanists, there is only one species (*C. flavus*). native of the E. Indies, but much cultivated also in the W. Indies and Africa: according to others, there are two species, *C. flavus*, with flowers entirely yellow, the pod marbled with dark streaks, and two or three seeds in each pod; and *C. bicolor*, called CONGO PEA in the W. Indies, the pulse of which is much coarser, and is used chiefly by negroes. The finer kind is nearly equal to the Common Pea. This kind of pulse is much used in tropical countries. The plant is a shrub (*Cytisus cajan* of Linnæus) about 18 inches high. It is half-hardy in s. England. In tropical countries, the plants stand and are productive for several years. They throw off their leaves annually, and reproduce them together with their flowers. The P. P. is one of the most valuable tropical kinds of pulse. It grows either on rich or on poor soils. It is called *Doll* and *Urhur* in the E. Indies. The name P. P. in W. Indian.

PIGGIN, n. *pĭg'ĭn:* see under Pig 2.

PIGHTEL, or Pightle, n. *pī'tĕl:* see under Pickle 2.

PIGMENT, n. *pĭg'mĕnt* [L. *pigmen'tum*, a paint—from *pingo*, I paint]: any substance used as a paint or color (see Paints): the mucous secretion which covers the iris of the eye, and produces its various colors; a coloring matter found in nearly all the fluids and tissues of the body, which gives color to the skin. Pigment'al, a. *-mĕnt'ăl*, pertaining to pigments. Pigmen'tum ni'grum, *nī'grŭm* [L. *nigrum*, black]: a black pigment found in black and dark feathers of birds, in black human hair, in the skin, etc.

PIGMY, n. *pĭg'mĭ:* see Pygmy.

PIGNEROL': see Pinerolo.

PIGNONS, n. plu., or Pinones, n. plu. *pĭn'ŏnz* [F. *pignon*, the kernel of the pineapple—from It. *pignone*—from L. *pinus*, the pine]: the edible seeds of the cones of various pines.

PIGNUS, n. *pĭg'nŭs* [L.]: in *law*, a pledge or security for a debt or demand.

PIGOTITE, n. *pĭg'ō-tīt* [after the Rev. Mr. *Pigot*]: a mineral compound of alumina and mudeseous [Gr. *mudēsis*, rottenness through excess of moisture—from *mudos*, damp]: acid, having a brownish-yellow color, found as incrustations on the sides of caves, etc.

PIGSNEY, n. *pĭgz'nĭ* [Gael. *beag*, little: AS. *piga;* Dan. *pige*, a girl]: in *OE.*, a term of endearment for a young girl; eye of a woman.

PIG-WEED, or Lamb's Quarters (*Chenopodium album*), of the Goosefoot family [Gr. *chen*, goose; *pous*, foot, referring to angular lobed leaves]: common weed around dwellings, farms, and roadsides, and known by its usual mealy foliage, the youngest leaves and spikes of inconspicuous greenish flowers, often red-iridescent, especially when damp with dew; some leaves (and in two varieties) green. There are 7 or more of the genus naturalized in N. America from Europe, and one or two from the tropics.—The Winged P. (*Cycloloma platyphyllum*), a coarse weed, leaves sinuate-toothed, and seed encircled by a membrane-wing, is found on the Mississippi and n.w. Spinach and beet belong to the same family.

PI'KA: see Lagomys.

PIKE, n. *pīk* [Ir. *pice;* Gael. *pìc*, a pike: W. *pig*, a point, a pike: Bret. *bek*, a beak, a point; *beked*, a pike-fish; *pik*, a pickax: comp. F. *pique*, a pike or pointed pole: L. *spica*, a point]: a kind of spear or lance head sharpened and mounted on a staff or pole, formerly used by foot-soldiers. Previously to the use of the bayonet, infantry of the line of battle—that is, the heavy-armed troops—were from earliest times armed with pikes or spears. The Macedonians carried pikes 24 ft. long; those of more modern warfare averaged 12 or 14 ft. They were of stout wood, tipped with a flat iron spearhead, which sometimes had cut-

ting edges. As a defense against cavalry, the pike, from its length and rigidity, was of great value; but though it long survived the introduction of gunpowder, that event was really fatal to it. For success with the pike, especially in offensive war, a depth of several men was essential, and this depth rendered the fire of artillery peculiarly fatal. The pike is now superseded by the bayonet on the end of the musket.—*Pike* is the name also of a voracious fresh-water fish—so called from its pointed snout or lower jaw (see below): also of an iron spring on a lathe: a pitchfork. PIKED, a. *pīkt*, furnished with sharp iron ends or points. PIKEMAN, a soldier armed with a pike. PIKE-STAFF, the pole or shaft of a pike.

PIKE (*Esox*): genus of malacopterous fishes, including all the species of the family *Esocidæ*, as restricted by Müller, and characterized by an elongated body, covered with scales, a depressed head, and broad blunt muzzle, with very large mouth, abundantly furnished with teeth of various sizes on the jaws, palatine bones, and vomer; no adipose fin; and the dorsal fin placed very far back over the anal fin. The species are not numerous; all are inhabitants of fresh waters in the n. hemisphere. Only one is found in Europe, the COMMON P. (*E. lucius*), native also of Asia and N. America. It is very generally diffused over Europe, and abundant even in far northern Europe. It is very plentiful in all parts of the British Islands. It is supposed not to be truly indigenous to them; but the statement often made, that it was introduced in the reign of Henry VIII., is certainly erroneous, as there is evidence of its existence in England much earlier. Edward I., graciously regulating the price of commodities for his subjects, fixed the price of the P. higher than that of the salmon, and ten times higher then that of the turbot and the cod; from which we may infer its comparative rarity at that period. Some waters in fenny districts of England are peculiarly adapted to P., which are there found in very great quantity, and of superior quality.

The P. is of dusky olive-brown color on the upper parts, becoming lighter and mottled with green and yellow on the sides, and passing into silvery white on the belly; fins brown; larger fins mottled with white, yellow, and dark green; tail-fin forked. The P. grows to a large size, occasionally attaining a weight of 60 or 70 lbs., though the stories of pikes much larger than this are liable to suspicion. The excessive voracity of the P. has long been proverbial. No animal substance which it can swallow, and which is capable of being digested, seems unpalatable to it; and no animal large enough to attract its attention, and which it can master, escapes being devoured. Mr. Jesse mentions an instance of eight pike, of about five lbs. weight each, consuming nearly 800 gudgeons in three weeks; and one of them devoured four roach, each about four inches in length, in rapid succession, and seized the fifth, but kept it

in his mouth for about a quarter of an hour before swallowing it. The P. readily attacks a fish of its own size, and preys freely on the smaller of its own species. Frogs are frequent prey; water-rats and ducklings are sometimes devoured. A large P. often takes possession of a particular hole in the bank of a river, from which it issues to seize any passing prey.—The P. spawns in the beginning of spring, for that purpose ascending narrow creeks and ditches, in which it is very easily caught

Pike, or Jack (*Esox lucius*).

by nets. Large quantities are caught at the spawning season in Lapland, and dried for future use. The P. grows very rapidly when the supply of food is abundant, reaching a length of 8 to 10 inches in its first year, 12 to 14 in the second, 18 to 20 in the third, and afterward increasing for a number of years at the rate of about four lbs. every year. A young P. is called sometimes a *Jack* or *Pickerel*. The name *Luce* (Lat. *lucius*) is still known as an English name of the P. The Scotch name is *Gedd*, similar to the names in the Scandinavian languages.

The flesh of the P. is much esteemed; but that of pikes of moderate size is reckoned the best.

The P. is caught not only by nets, but also by the rod, by set lines, and by *trimmers* or *liggers*, which may be briefly described as floats with lines so attached that the bait swims at a proper depth, and that some yards of line run out when the bait is taken. The floats are sometimes of wood or cord, sometimes of bundles of rushes, sometimes of bottles. In angling for P., various baits are used, e.g., a minnow, parr, or other small fish, a portion of a fish, etc.; sometimes an artificial fly is employed with great success, made of two large hooks tied together and adorned with two *moons* from a peacock's tail. The angler unaccustomed to the P. must be cautioned as to the manner of taking the hook from its mouth, as any rashness may lead to severe laceration of the hand by its teeth. P. may be fished any time from May to Feb. inclusive, except when there is actual freezing. Nov. is considered the best month; the P. are then in best condition. One of the most approved tackles for angling for the P. is the *Spinner*, baited with

a small dace, bleak, gudgeon, or parr of about two ounces, as represented in the figure above. The mode of using it is thus described in Bailey's *Angler's Instructor:* 'Having cast your bait as far as possible, allow it, if you are fishing in a pond, or lake, or deep water, to sink a little, say two ft., then wind away at a brisk rate, holding your rod on one side rather low; if no run, wind

Pike Spinner.

out and throw again, but this time wind brisk four or five yards, then all of a sudden stop a moment, then off again, doing so three or four times in one cast. I have often found this a good plan. If you still have no run, try another throw and wind brisk as before, but occasionally giving your rod a sharp but short twitch.' See also Stonehenge's *British Rural Sports* (London 1875).

Other species of P. are found in the lakes and rivers of N. America, as *Esox estor*, which is sprinkled with round blackish spots; and *E. reticularis*, which is marked with a network of brownish lines; it is the Common Pickerel of the United States. (See PICKEREL.) Much confusion exists in common names of fishes. In some U. S. localities, the Pike-Perches (q.v.) are called Pike.—Other N. Amer. species of *Esox* are the Brook Pickerels: *E. Americanus*, e. of the Alleghanies; *E. umbrosus*, in the Mississippi basin; neither much over 1 ft. long.—The MASKALLONGE (Fr., *masque allongé*, long face) or Muskelunge (*E. nobilior*) is the king of P., measuring 4–6 ft.; it has cheeks without scales, and is dark gray, with round black spots; it is found, though not abundantly, in all the great lakes of N. Amer.

The Garfish (q.v.) is called sometimes the Sea Pike. The same name is given also to certain large voracious fishes of warm seas, belonging to the perch family.—For the Saury P., see that title.

PIKE, *pīk*, ALBERT: 1809, Dec. 29—1891, Apr. 2; b. Boston. He studied at Harvard College, taught at Newburyport, and went to New Mex., then an almost unexplored region, walking several hundred miles of the way. After serving as a clerk at Santa Fé, he made his way, through great hardships, to Fort Smith, Ark., where he engaged in journalism and studied law. He served in the Mexican war; made treaties with the Indians, and was brig.gen. commanding the Indian allies of the Confederacy during the civil war. He was editor of the *Memphis Appeal* 1867, but the following year removed to Washington where he practiced law till 1880. In early life he

ALBERT PIKE.

won repute as a poet and a prose writer. He was a noted Freemason, and became not only the highest officer of the fraternity in the United States but 'the ranking Masonic dignitary of the world.' Among his books are *Prose Sketches and Poems* (1834); *Law Reports*, 5 vols.; *Nugæ* (poems); and 25 vols. of Masonic works.

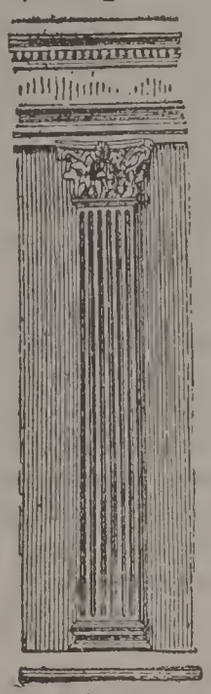
PIKE, Zebulon Montgomery: 1779, Jan. 5—1813, Apr. 27; b. Lamberton, N. J. He studied at Easton, Penn., to which place his father had removed, became an ensign in the army 1799, and by promotions reached the rank of capt. 1806. He continued his studies during the early years of his army service, and was engaged in explorations concerning the source of the Mississippi river and discovered Pike's Peak. In 1813 he commanded an expedition against York, since called Toronto, Canada. A landing was effected and one of the defenses was captured, but while arranging for an attack on another point, P. was injured by the explosion of a powder magazine and died in a few hours. For his early exploring services he had received the thanks of the govt., and he had been rapidly promoted through the various milit. grades till he reached that of brig.-gen., 1813, Mar. 12. He published (1810) a history of the explorations which he had conducted in the then newly acquired Louisiana territory.

PIKE-PERCH (*Lucioperca*): genus of fishes of the perch family; having two dorsal fins, of which the first has strong spiny rays; but resembling the pike in its elongated form, large mouth, and formidable teeth. The muzzle is not, however, broad and depressed, as in the pike. Several species are known, of which one (*L. sandra*) is common in the Danube, and in most rivers and lakes of n.e. Europe, extending w. to the Oder and the Elbe, though not found in Italy, France, or Britain. It is highly esteemed for the table. Salted and smoked it is a considerable article of trade in parts of Europe. It is a fish of rapid growth, and attains a weight of 25 or 30 lbs. This fish readily takes the minnow and the artificial fly. It is called *Sander*, *Sandel*, or *Sandat*, in parts of Germany; *Nagmaul* in Bavaria; and *Schill* at Vienna.—Another species (*L. Americana*), much resembling it, of greenish-yellow color, is found in the lakes and rivers of N. America. The American Wall-eyed P.-P. is known as Pike, or Yellow or Blue Pike; and a fish of the same genus (*Stizotedium canadense*) is called the Gray, or Sand, or Ground Pike, and even Pickerel.

PIKE'S PEAK: peak of the Rocky Mountains, in Colorado, 75 m. s. of Denver (q.v.), discovered by Gen. Pike, U.S.A., 1806. Its height is 14,151 ft., and it commands a view, of 100 m. radius, of a rugged, mountainous country, containing many lakes, and the sources of four great rivers—the Platte, Arkansas, Rio Grande, and Colorado of California. In 1858 large deposits of gold were discovered here; and during the first four years after the discovery, there were shipped more than $30,000,000 in gold. It abounds in rich gold-bearing quartz.

The mining country is 5,000 ft. above the sea, with a dry climate. An important high-level observatory, meteorological and astronomical, has been established near the summit.

PILASTER, n. *pĭ-lăs'tẽr* [F. *pilastre*—from It. *pilastro*, a pilaster—from L. *pila*, a pillar]: in classical architecture, a square pillar, sometimes standing free, but usually attached to a wall, from which it projects $\frac{1}{5}$, $\frac{1}{4}$, or other definite proportion of its breadth. Greek pilasters, or antæ, were of the same breadth from top to bottom, and had different capitals and bases from those of the orders with which they were associated. The Romans gave them a taper like the columns, and the same capitals and bases. PILASTERED, a. *pĭ-lăs'tẽrd*, furnished with pilasters.



Pilaster.

PILATE, *pī'lat*, PONTIUS (PONTIUS PILATUS): procurator, or Roman gov. of Judæa A.D. 26–36. Besides his relation to the crucifixion of Jesus Christ, very little is known of the life of P. He was of equestrian rank and was indebted for his promotion to high office to Sejanus, Tiberius's prime minister. His residence as gov. of Judæa was at Cæsarea. The occasion of his being deposed from office, A.D. 36, was a complaint brought to Vitellius, the Legate of Syria, that P. had caused an assembly of Samaritans on Mt. Gerizim to be attacked and massacred.—P.'s wife is known to tradition under the name of Procla, or Claudia Procula; in the Greek Chh. she is venerated as a saint, her festival occurring Oct. 27.

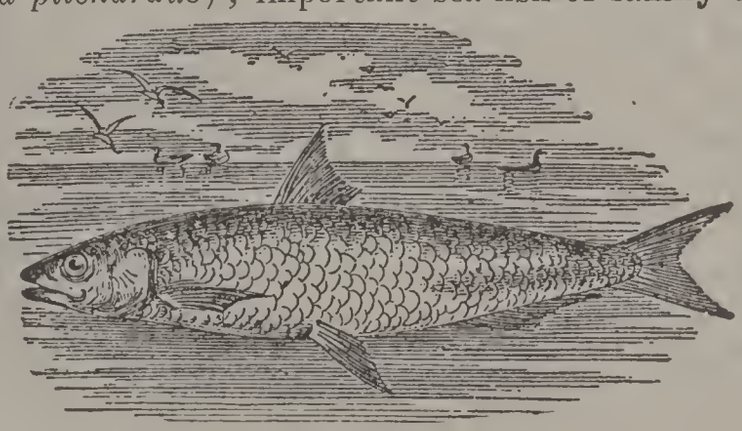
In previous centuries, the character of P. was regarded from points of view so very different that by some he was made little less than a demon, and by others was even sainted. It is now generally agreed that he was simply an example of the selfish worldly type of office-holder, with something of a Roman sense of public justice, and, as a Roman, looking with the impartiality of indifference on Jewish ideas and prejudices. There is no reason to impute humane motives to one who had not hesitated in his previous career to resort to severe measures without scruple. Nor is there any ground for representing P. as a man of weak, vacillating temper; his previous acts do not sustain such an interpretation, and the gospels record only his repeated efforts to save his own popularity and tenure of office (threatened by the Jews), while he sought to set free a prisoner innocent, in his view, of crime, or, at least, to shift the responsibility upon Herod Antipas. He was a politician. Once, in the course of the procedures, he resorted to a compromise—that of scourging. His selfishness finally carried the day, and gave him forever a bad eminence. The washing of his hands was rather

a not rare mode of disavowal of responsibility than an act of compunction. His question 'What is truth?' showed his entire blindness to the true character of the august being whom he delivered over to the vengeance of the Jews. His fear, when the Jews accused Jesus of making himself the Son of God, need not be interpreted as anything more than the superstitious belief of a heathen in 'gods many,' and in their occasional appearances among men—a superstitious feeling that may have been awakened by his wife's warning dream. The final cunning reference to P.'s loyalty to Cæsar, appealing to selfish fear, turned the scale: 'When Pilate therefore heard that saying, he brought Jesus forth, and sat down in the judgment seat.'

PILAU, or PILAW, *pĭ-law':* a dish common in India, Turkey, Egypt, and Syria, consisting generally of rice, but occasionally some animal food is added. The correct method of preparing it is to boil the rice 20 minutes, with sufficient water to soak it thoroughly, and swell the grains to their utmost, taking care not to break them by making them too soft; it is then drained, and gently stirred with butter, pepper, and finely-chopped onions, and served up. For the tables of the more wealthy, fowls, lamb, mutton, shreds of ham or bacon, variously cooked, but always much boiled or roasted, are placed on top of the rice and served with it. In India, very numerous and elaborate receipts are in use.

PILCH, n. *pĭlch* or *pĭlsh* [It. *pelliccia;* F. *pelisse,* a furred cloak; AS. *pylce,* a furred garment; Gael, *peallag,* a mat, a skin (see PELISSE and PELT 3)]: a gown lined with fur; a piece of flannel to be wrapped about a child. PILCHER, n. *pĭlsh'er,* in *O.E.,* a buff or leathern jerkin; the leather sheath of a sword; in *slang,* a stealer; a thief.

PILCHARD, n. *pĭlch'erd* [probably of Celtic origin; comp. Ir. *pilseir,* a pilchard; Ir. *pelog,* Gael. *peuig,* a porpoise; W. *pilcod, minnows*], (*Clupea pilchardus,* or *Albusa pilchardus*); important sea-fish of family *Clupei-*



Pilchard (*Clupea pilchardus*).

dae (q.v.), referred by some naturalists to the same genus with the Herring (*Clupea*), and by others to the same genus with the shad (*Alausa*). The P. is nearly

equal in size to the herring, but rather thicker, and the lines of the back and belly are straighter; the scales are larger and fewer; and the dorsal fin is rather further forward. The mouth is small, and in the adult fish destitute of teeth; the under jaw longer than the upper. The upper part of the body is bluish-green; the sides and belly silvery white; the cheeks and gill-covers tinged with golden yellow, and marked with radiating striæ; the dorsal fin and tail dusky. The P. is an inhabitant of more southern seas than the herring. The P. is found off the coasts of Ireland, France, Spain, and Portugal; and it is less plentiful than formerly on the coasts of Devon and Cornwall. Like the herring, it was formerly supposed to be migratory; but, as in the case of the herring, this opinion has been relinquished; and the shoals of pilchards seen on the coasts are believed merely to issue from deeper waters near, for the purpose of spawning. The spawning season begins early in summer; but on the coasts of Devon and Cornwall, the principal fishery is in Aug. and Sep. Pilchards are caught either with drift-nets or seine-nets, principally with seine-nets. By means of one or more seines, each 360 ft. long and 36 ft. deep, a shoal is inclosed; the bottom of the net is then drawn together by a peculiar contrivance, and the pilchards are taken out at low water by small bag-nets. Prodigious numbers are sometimes inclosed in a single seine. More than 24 millions are said to have been taken at once from a single shoal, which, however, may have been spread over several sq. miles. The approach of a shoal is known by the rippling of the water, and the sea-birds hovering above, and is often watched for and marked from the shore. In some years the quantity taken in the P. fishery on the English coast is enormous, and the capital invested in it in Devon and Cornwall is probably not much under £1,000,000. Great quantities of pilchards are annually exported to the W. Indies and elsewhere. Those for exportation are pickled, and packed in barrels under great pressure, by which oil is expressed to the amount of three or four gallons from a hogshead of fish. The oil, with the blood and pickle with which it is mingled, is generally used for manure. A favorite Devonshire dish is a pie of pilchards, with their heads protruding from the crust. It is now generally admitted that the P. and the sardine are identical, and pilchards have been prepared like sardines, in oil. It is said that the Cornish sardines cannot be distinguished from those imported from France. —A great number of boats are employed in the P. fishery in and near the estuary of the Tagus. The P. is known in Scotland as the *Gypsy Herring*.

PILCOMAYO, *pĭl-kō-mī'ō:* river of S. America, whose course has not as yet been thoroughly explored, drawing its waters from the Bolivian Andes, and formed by confluence of two rivers, the Suipacha and the Pilaya. Of these head-waters, the south one, the Suipacha, rises in the mountains immediately s. of Potosi; while the n. affluent, the Pilaya, drains the valleys around Chuquisaca. These streams unite in lat. about 21° 35′ s., to form the P., which flows s.e., crosses the Bolivian frontier, waters the n.e. region of the Argentine Confederation, and falls into the Paraguay a few m. below Asuncion. It is at least 1,200 m. in length; but its waters are much spent in lagunes on its course, so that it adds no great volume to the Paraguay. It is navigable about 500 m.; but hordes of hostile Indians render navigation perilous. Before entering the Paraguay, it divides into two arms, of which the n. is called Araguay-Guaso; and the s., again dividing into two branches, the Araguay-Mino. The mouths of the P. are narrow, deep, and much obstructed by water-plants

PILE, n. *pīl* [F. *pile,* a ball to play with, a heap—from L. *pĭla,* a ball or globe: Dut. *pĭjl,* a heap]: a large building or mass of buildings; a heap of a roundish elevated form; a heap; an accumulation: V. to collect or gather together in a heap or mass; to accumulate; to fill above the brim or top. PIL'ING, imp.: N. the act of making into a heap by placing one above another; the act of reheating iron blooms or slabs for further working. PILED, pp. *pīld.* FUNERAL PILE, *anc.,* a collection of combustible material for consuming a dead body. VOLTAIC or GALVANIC PILE, a series of plates of copper and zinc laid one above the other alternately, with cloth or paper placed between each pair, moistened with an acid solution, for producing a current of electricity. PILES, n. plu. *pīlz,* a disease of the veins at the extremity of the rectum (see below).

PILE, n. *pīl* [L. *pilus,* hair: F. *poil,* hair, nap]: a short, thick, hairy surface; nap.

PILE, n. *pīl'* [L. *pīla,* a pillar, a pier of stone: It. *pila:* W. *pill,* the stem or stock of a tree]: a large stake or piece of timber, or (iron pile) an iron cylinder, driven into the earth to support the foundation of a building or the pier of a bridge. Piles are usually squared logs of wood used in engineering operations, such as dams, bridges, roads, etc. They are sharpened at the point, and, if necessary, protected with iron points, to enable them to cut through the strata which they encounter as they are driven into the ground. When used for coffer-dams, or such temporary purposes, they are placed close together, and driven firmly into the earth; the water is then pumped out, and the piles form a dam, to enable workmen to lay foundations of piers, etc. When the force of the water round the dam is great, two rows of piles are driven in all round, and the space between the rows filled with clay, and puddled. Piles are used also for permanent works, when they are driven through loose soil till they reach a firm bottom, and thus form a foun-

dation on which buildings, roads, etc., may be placed. Cast-iron is frequently used for piles, which are cast hollow. Wharf-walls are sometimes of piles; they are then cast with grooves on the sides, into which cast-iron plates (forming the walls) are fitted. A kind of pile of great use in loose and shifting substances is the screw-pile, and consists of a long shaft (of wrought-iron), with a broad cast-iron disk, of screw form at the lower end. These piles are useful especially where light-houses, beacons, etc., have to be placed on sands. They are fixed by means of capstans, which give them a rotatory motion. Common piles are driven in by machines called *pile drivers*, in which a heavy weight (or monkey) is raised to a considerable height between two guides, and then let fall on the head of the pile. The application of steam to these drivers has made them very powerful engines—Nasmyth's steam-hammer being a well-known instance. In 1843 a kind of pile was introduced which consists of hollow tubes of iron, from which the sand, etc., within them is removed by an air-pump, and the pipes are then sunk. In recent railway bridges, cylinders have been much used to form both piles and piers. They are of cast-iron, and made in pieces (each about 6 ft. in height), applied one on top of another. The sand or gravel is removed from the inside of the first laid, which thus sinks down; another cylinder is placed above it, and the same process continued till it also has sunk sufficiently; and so on, cylinder over cylinder, till a solid foundation is reached. The requisite number of cylinders is then piled up to form the pier above ground.—*Pile* is also the name given to one side of a coin—so called from the punch used in stamping the figures; the arms side of a coin, as distinguished from the head, which was formerly marked by a cross: in *her.* (see below): V. to drive piles into. PI'LING, imp.: N. the act of driving in piles; a series of piles; piles collectively, as the piling of a bridge. PILED, pp. *pīld.* SHEET-PILING, a series of piles of planks driven edge to edge. PILE-BRIDGE, bridge whose piers are built with piles. These may be either temporary wooden structures, in which wooden piles, driven into the ground, serve also as piers, or they may be permanent bridges, with iron cylinders forming the piles below the surface, and piers above. PILE-DWELLINGS: see LAKE-DWELLINGS: PFAHLBAUTEN. PILE-ENGINE, or PILE DRIVER, an engine for driving in piles. PILE-WORK, houses or erections on a foundation of piles amidst water. CROSS AND PILE, in *OE.*, equal to modern phrase 'head and tail'; a piece of money with a cross on one side, the opposite side being called the *pile.*

PILE, *pīl*, in Heraldry: an ordinary, or, according to some heralds, a subordinary, in form of a wedge, issuing usually from the middle chief, and extending toward the middle base of the shield. A pile *transposed* is one whose point is upward.

PILEATE, a. *pī'lĭ-āt*, or PI'LEATED [L. *pilĕātus*—from *pilĕus*, a close-fitting felt cap]: in *bot.*, having a cap like the head of a mushroom. PILEIFORM, a. *pī'lĭ-fawrm* [L. *forma*, shape]: resembling a hat or cap. PILEUS, n. *pī'lĕ-ŭs*, in *bot.*, the cap-like portion of the mushroom bearing the hymenium on its under side; in *Rom. antiq.*, a felt cap or hat; a skull-cap worn by the Romans.

PILEORHIZA, n. *pī'lĕ-ō-rī'zā* [Gr. *pilĕŏs*, a cap; *rhiza*, a root]: in *bot.*, a covering of the root; a cap found at the end of all true roots.

PILES, *pīlz*, or HEMORRHOIDS, *hĕm'ŏr-royds:* small tumors either within or on the verge of the anus. They consist of folds of mucous and sub-mucous membrane in an inflamed, infiltrated, or permanently thickened condition, and usually contain enlarged veins. There are several varieties of these tumors. Sometimes the pile is composed mainly of a little knot of varicose veins in the sub-mucous tissue; in this case, it is readily emptied, by pressure, of the fluid blood contained in it, which, however, returns when the pressure is removed. Sometimes the blood in a dilated vein coagulates, forming a solid tumor surrounded by tissues, thickened in consequence of inflammation; or the tumor may consist of a kind of erectile tissue formed by an abnormal condition of the vessels of the mucous membrane; this variety is especially liable to bleed. These tumors are divided into *bleeding* and *blind* piles, according as they are or are not accompanied with hemorrhage; and into *internal* and *external* piles, according as they are within or without the sphincter muscle of the anus.

The following are the general symptoms of this affection: The patient, after having experienced for a varying time a feeling of heat, fulness, and dull pain about the lower part of the bowel, becomes conscious of a sensation as if there were a foreign body in the anus; and on examination after an evacuation, discovers a small tumor, usually about the size of a grape, which either remains outside, or is retracted, according as it originated without or within the sphincter. This tumor gradually increases, and others form around it, until a mass at length results as large as a pigeon's egg, or larger. In its ordinary *indolent* state the tumor has little sensibility, and occasions comparatively little annoyance; but when it is *inflamed* (from strangulation of the sphincter muscle, or from any other cause), it is exquisitely tender to the touch, and is the seat of burning and stinging sensations, rendering the evacuation of the bowels (and sometimes of the bladder also) difficult and painful. In women, an inflamed pile may cause pain in the back, irritation of the womb, with mucous discharge, and many other anomalous symptoms. In severe cases, the patient can neither stand nor sit with comfort, and finds relief only in the horizontal position.

Piles may be caused by any circumstances which cause congestion in the lower bowel, such as luxurious and sedentary habits, pregnancy, and such diseases of the liver as tend to check the return of blood from the veins of the rectum. Moreover, anything that causes irritation of the

rectum, such as acrid purgatives, especially aloes;—also dysentery, inflammation of the prostate gland, etc., may cause piles. But of all causes, constipation is probably the most frequent; it operates in producing them partly by pressure of the accumulated and hardened fæces on the veins carrying the blood away from the rectum, partly by the straining and the irritation which such fæces occasion during their evacuation.

In the treatment of piles, it is expedient to relieve the congested state of the lower bowel by one or two doses of sulphate of magnesia, and a cooling vegetable diet; after which the continued use of mild laxatives should be resorted to. Far the best time for the bowels of patients of this kind to act is about bed-time, as the parts irritated by the passage of the evacuation become quieted during the night. In all cases, professional advice should be had, and such advice, early secured, may prevent the chronic character of the disease. Among milder forms of local treatment are: (1) injection of the rectum with cold water both before and after the motion; (2) washing the anus with cold water or yellow soap and cold water after every evacuation; (3) application of gall ointment or of other astringents; (4) injection of astringent lotions, e.g., sulphate of iron, in the proportion of a grain to an ounce of water. If these fail, recourse may be had, indispensably under surgical or medical attendance, to pressure by means of instruments specially devised for the purpose; to application of strong carbolic or nitric acid, which, in the case of internal piles, affords the most speedy and effective means of relief; to ligature; or, in the case of external piles, to excision. When the piles are inflamed, leeches to the anus (not directly to the tumors) are sometimes required; but the inflammation generally subsides under the influence of rest in the horizontal position, fomentations, poultices, and low diet. An ointment which often affords relief in mild cases is composed of: iodide of potassium, 3 grains; powdered opium, 5 grains; powdered camphor, 10 grains; tannin, 2 drams, and vaselin or other smooth ointment, 1 ounce. Apply on a soft rag or wad of cotton.

If the hemorrhage or bleeding that frequently accompanies piles is moderate in quantity, and has continued some time without inducing weakness or any other bad symptom, it is not usually expedient to interfere with it. When, however, it obviously requires checking, the effect of cold water injected into the rectum, as above recommended, should be tried; and, in case of its failing, recourse should be had to astringent injections.

PILE, THERMO. See ELECTRICITY, THERMAL.

PILE, VOLTAIC: alternate discs of two different metals with cloth or other absorbent moistened with acidulated water inserted between the discs, making a form of electric battery having but little liquid.

PILE'WORT. See RANUNCULUS.

PILFER, v. *pĭl'fĕr* [OF. *pelfre*, goods taken by force; *pelfrer*, to plunder: L. *pilārĕ;* It. *pelare*, to fleece: Sp. *pelar:* F. *piller*]: to steal, applied to petty thefts; to filch. PIL'FERING, imp.: ADJ. practicing petty thefts: N. petty thefts. PIL'FERED, pp. *-fĕrd.* PIL'FERER, n. *-ĕr*, one who pilfers. PIL'FERINGLY, ad. *-lĭ.* PIL'FERY, n. *-ĭ*, petty theft.

PILGARLIC, or PILL-GARLIC, n. *pĭl-gâr'lĭk* [Gael. *peall*, a skin; *galar*, a disease]: in *OE.*, one whose hair has fallen off, or skin peeled off from disease; a poor sneaking creature. *Note.*—Others say the term is *pilled-garlic*, meaning one who *peels garlic* for others to eat, an occupation assigned to a class who endured hardships and ill-usage.

PILGRIM, n. *pĭl'grĭm* [It. *pellegrino;* Sp. *peregrino;* Ger. *pilger;* F. *pélerin*, a pilgrim: L. *peregrīnus*, a foreigner, in mid. L. a pilgrim—from L. *per*, through; *ager*, a territory or district]: wanderer; traveller to a distance to visit a holy place, or a place sacred from its associations (see below). In *Scrip.*, applied to the true Christian, as one whose home is in the better country. PILGRIMAGE, n. *pĭl'grĭm-āj*, a journey to a distant place for a devotional purpose; a tour; an excursion; in *Scrip.*, the journey of life.

PIL'GRIM: one who visits, with religious intent, some place reputed to possess especial holiness; or who goes forth to strange lands under religious motives. The early Christians, like the Jews and the pagan Gentiles, regarded certain places with special religious interest; above all, the Holy Land, particularly the scenes of the Passion of our Lord at Jerusalem. St. Jerome (Ep. xliv.) refers the practice of visiting Jerusalem to the discovery of the Holy Cross by St. Helena. He himself was a zealous pilgrim; and throughout the 4th, 5th, and 6th c. pilgrims habitually undertook the long and perilous journey to the Holy Land from almost every part of the West. Other sacred places, too, were deemed fit objects of like visits of religious veneration. The tombs of the apostles Peter and Paul, and of the martyrs in the catacombs at Rome, are so described by St. Jerome (*Commentar. in Ezekiel*). St. Basil speaks in the same terms of the tomb of the Forty Martyrs; and the historian Theodoret tells of not only visiting such sanctuaries, but of hanging up therein, as offerings, gold and silver ornaments, and even models of hands, feet, eyes, etc., in commemoration of the cures of diseases supernaturally obtained by these pious visits. The PILGRIMAGE, however, pre-eminently so called, was that of the Holy Land; and even after Jerusalem had been occupied by the Saracens, the liberty of pilgrimage, on payment of a tax, was formally secured by treaty; and it was from the necessity of protecting pilgrims from outrage that the well-known MILITARY ORDERS (q.v.) had their origin. The CRUSADES (q.v.) may be regarded as a pilgrimage on a great scale; the direct object being to secure for the Latin Christians immunity of pilgrimage. On the other hand, the final abandonment of the Crusades led to a great extension of what may be called domestic pilgrimage, and drew into

religious notice and veneration many shrines in Europe, which, after the lapse of time, became celebrated places of pious resort. The chief places of pilgrimage in the West were: in Italy—Rome, Loreto (q.v.), Genetsano, Assisi; in Spain—Compostella, Guadalupe, Montserrat; in France—Fourvières, Puy, St. Denis; in Germany—Oetting, Zell, Cologne, Trier, Einsiedeln; in England—Walsingham, Canterbury, and many others of minor note. The pilgrim commonly bound himself by only a temporary vow (differing in this from the permanent vow of the Palmer, q.v.), and which terminated with the actual visit to the place of pilgrimage, or at least with the return home, and by which he was bound for the time to chastity and to certain other ascetic observances. The costume consisted of a black or gray gabardine, girt with a cincture, from which a shell and scrip were suspended, a broad hat, ornamented with scallop-shells, and a long staff. Many abuses arose out of these pilgrimages, the popular notions regarding which may be gathered—though, probably, with a dash of caricature—from Chaucer's *Canterbury Tales*. Pilgrimages, which have always been in vogue in Italy, Spain, southern Germany, and Switzerland, had gone much into disuse in France during and since the Revolution; but in late years pilgrims have resorted in large numbers, not only to the ancient sanctuaries of Notre Dame de la Garde, de Fourvières, de Puy, etc., but also to La Salette, Lourdes, Paray-le-Monial, and Pontigny. In 1873 and 4 organized parties of pilgrims on a very large scale from France, Belgium, England, the United States, etc., visited the sanctuary of Paray-le-Monial, the place at which the vision of Marie Alacoque, which gave rise to the devotion to the Sacred Heart of Jesus (q.v.), is recorded to have taken place. In 1874 English pilgrims to the number of 500 visited Pontigny. Numerous pilgrimages have been held in Belgium also.

PILGRIM FATHERS.

PILGRIM FATHERS, The: first English settlers at Plymouth on the coast of Cape Cod Bay; earliest pioneers of permanent settlement in New England; forming the Plymouth Colony, known as the Old Colony; but ultimately (1692) merged with the Massachusetts Colony, which bordered it on the n. toward Boston harbor. Very early custom marked as old comers or forefathers the three several parties who came, 100 on the *Mayflower*, 1620; 35 on the *Fortune*, 1621, Nov. 9; and about 60 on the *Anne* and the *Little James* 1623, Aug. 1; these three companies representing, but with some additions, a special body of English people who had gone out of England 1608 to Amsterdam in Holland, and since 1609 had lived at Leyden, in Holland, organized as a church on a liberal basis of evangelical faith and ecclesiastical independency nowhere else known. This church had sprung up at Scrooby in Nottinghamshire, close to Austerfield in Yorkshire, in connection with a kindred church 9 m. e. at Gainsborough, which had somewhat earlier organized secret exercise of worship apart from the established church of England. Such worship, forbidden by law under the penalties of sedition, and punished in several cases already by severe imprisonment and death, was desired and made a matter of conscience by a small class among the Puritans, who objected to state control of religion, to church organization on any basis except that of the local union or fellowship of Christ's true spiritual disciples, and to any imposition of forms in public worship by civil or ecclesiastical law, and to any restriction on entire freedom of study of Holy Scripture and of practice according to its precepts. The great body of Puritans, while equally desiring true religion, and some reforms in church order and worship, were strongly in favor of control of religion by law, and of belief and worship enacted and enforced. This great majority of Puritans joined in stigmatizing as 'Separatists,' and as guilty of 'schism' that class (at Scrooby, afterward at Leyden and Plymouth), whose principle was that of freely exercising the worship of God among themselves, without control from any, or any imposition of beliefs, forms, methods of organization, or of activity. The church Puritans and the non-church Puritans were thus opposed on English ground; and the latter had to flee as exiles for Christian liberty; while the former could stay in hope of themselves gaining power in the church, and thereby having their own way of control by law, of enacted and enforced faith and worship, and of church and social order strictly imposed. The 21,000 Puritans of this latter type, who came over 1628–40, and mainly settled New England, had little original affinity, on the ground of complete freedom of worship, with the Separatist Puritans (to whom indeed the name Puritans can scarcely with propriety be applied) from whom the Pilgrim Fathers came. Much, in fact, of the troubles of the latter were due to the antipathy of church-and-party Puritans toward non-church free Puritans, such as the Pilgrims were.

Queen Elizabeth's execution of the sentence of death on Mary Queen of Scots set in motion the course of events

which brought the Pilgrims to these shores. To appear to clear herself in the matter she discarded Sec. Davison; and this broke off the career at court of William Brewster, and sent him to Scrooby, to take charge of the govt. post, whose offices were in an old palace of the abp. of York. Brewster gathered and gave shelter to the Scrooby church of radical Puritans; and was its stay and leader then and later, together with a non-church Puritan minister, John Robinson, who became the famous Pilgrim pastor. A notable third man, also of rare type, was William Bradford, who served 31 years of the period 1621–57 as gov. of Plymouth Colony, and who, 1630–50 set down the Pilgrim history (1606-46) in annals which show many a rare touch, and tell one of the great stories of the world. The Scrooby company were a gathered church 1606, in great peril, if their weekly exercise of free non-church worship was discovered, and in the autumn of 1607 they made an attempt to go into exile by ship from Boston, England, but the ship-master betrayed them to the constables, who harried them savagely, haled them to prison, and only after this barbarous treatment left them to return to their abandoned homes. The next spring, 1608, they contrived to escape from England from a lonely seashore common near the mouth of the Humber, between Grimsby and Hull; and with many mishaps and hardships, from the constables attacking them and the sea almost overwhelming them, finally came together at Amsterdam about the end of summer. The Gainsborough non-church company had reached Amsterdam a year or two earlier, with the notable John Smyth as their minister; and earlier still a considerable congregation under Francis Johnson and Henry Ainsworth had become established there. These Smyth and Johnson peoples held their non-church views rigidly, used harsh judgment toward both Romanists and English Episcopalians; and were narrow and contentious even among themselves on differences of no great moment. The temper, ideas, and habit of Robinson and Brewster, and those under them, were the contrary of all this—wholly liberal and charitable, tolerant and broad, judging kindly of Romanists even, and owning the English church as their own by birthright and much grateful memory, however bound they were to 'separate' for more perfect spiritual culture. The one class of non-church 'Separatists' followed the views and spirit of Robert Browne, and were known as Brownists or Rigid Separatists: the other class were represented by Robinson, Brewster, and the Pilgrim church. So marked did the contrast become after the removal 1609 of the Pilgrim church from Amsterdam to Leyden, that Edward Winslow, who joined them there, relates that 'the Brownists at Amsterdam would hardly hold communion with the people at Leyden.' The removal to Leyden was made after a year at Amsterdam because Robinson and Brewster foresaw the course of rigor and contentious narrowness threatened by the Smyth and Johnson churches; and thought it best to sacrifice worldly interests, to which the great commercial seaport was more favorable, for the sake of the peace, love, and comfort in

fellowship, which they might find in the university city In due course John Smyth denounced Robinson's church as 'no better than its mother, the Church of England, and its grandmother, the Church of Rome;' while Robinson said, in protest against the more harsh Separatist views, 'God hath his people in Babylon. Neither is "the baptism in Rome a Babylonish washing," as they calumniate. Much less can that vitupery agree to the Church of England.' At the date of the plans of the Pilgrims for coming to America, one of them gave as a reason why the Amsterdam Separatists would not care to join in the expedition, 'Our liberty is to them as ratsbane, and their rigor is to us as the Spanish Inquisition.' The learned Puritan historian, Prince, specially complained that 'noted writers' made the 'great mistake' of classing Robinson with the rigid Separatists; when even so bitter an inveigher as Robert Baylie, commending him as 'the most learned, polished, and modest spirit that ever separated from the Church of England,' said that he 'ruined the Rigid Separation, was a chief overthrower of the Brownists, and became the author of Independency.'

During the 11 years' residence of the Pilgrims at Leyden, 1609–20, the Pilgrim minister, with three others, had a large house opposite the principal church; and around the margin of the ground belonging to it they built 21 cottages, thus bringing 25 families into very close social relations: other families had homes elsewhere in the city. The difficulty of living was so great that though many came to them, and they grew a great congregation, meeting in their pastor's house, not a few were forced by want to return to England, and some even preferred, Bradford says, to go back into English prisons rather than meet the hardships of liberty in Holland. The whole body were specially noted by the Dutch for their industry, strict integrity, peace, and quiet; and Robinson came to the very front of Dutch theology, surpassing the Dutch divines in coping in public discussion with the accomplished leaders of Arminianism, whom he put openly to an apparent non-plus, says Bradford, not alone by his great learning and rare skill in speech, but by the temper of charity, fairness, breadth, and liberality, in which he was in contrast with the Calvinists whose side he took, and was superior to even the broader-minded Arminians; his regular habit having been to hear the teaching of both sides, and to ever hold himself desirous of more light, from whatever quarter it might come. His theological writings are rich in expressions implying a broad-church liberalism, which led Prince to note that the Pilgrims 'renounced all attachment to any mere human systems or expositions of Scripture, and reserved an entire and perpetual liberty of searching the inspired records, and of forming both their principles and their practice from those discoveries they should make therein, without imposing them on others;' and also to note of Robinson that 'in that age of low and universal bigotry this truly great and learned man seems to be almost the only divine who was capable of

rising in a noble freedom of thinking and practicing in religious matters.'

Being Calvinistic in doctrine, the Pilgrims were allowed liberty in Holland; but the Dutch Calvinism of the period, 1609–21, ran a course of violent intolerance and cruel persecution of non-Calvinists, ending with the infamous murder of Barneveldt, the imprisonment of the great scholar, Grotius, and the expulsion from office, and expatriation, of numbers of the best preachers and people of Holland. In general the Dutch let Robinson and his people severely alone; and even when the famous pastor had shown himself unequalled in his mastery of the current discussion, they had no favor which they dared grant, because they stood in fear of the English govt. Some favor extended by the university, some applause of Robinson's skill in Latin theological debate, and some recognition of his rare character, were all that the Dutch ever bestowed on the Pilgrim scholar, saint, and statesman.

The great hardness of Holland as a place to live in, the loss of English relation, the want of opportunity to educate their children or even to protect them from bad influences, the low ideas of the Dutch as to keeping the Sabbath, and the 'raging plague,' as Robinson called it, of Dutch disputes in doctrine, led the leaders of the Pilgrim church to consider that even savage America under English rule would be 'much better than Holland.' A plan was matured after extended consideration among themselves, and negotiations with the English govt. from which at best only very limited favor was secured. Some 70 persons in and about London joined in raising money to take stock in a colony, with a view to profits, as well as for the cause represented by the Pilgrims. These not only had in part a mercenary motive, but many of them were zealous church-Puritans, who allowed non-church people to risk their lives in breaking the ice for a colony, but as soon as that was done, opposed the going over of any more of the Leyden people; and in particular prevented Robinson from going, as he made every effort to do until his death, 1625, Mar. 1. These 70 stockholders were not of those who went; but they sent some colonists of non-Pilgrim character, a few of whom were an evil element even in the *Mayflower* company. The plan adopted was for a voyage to some part of the region owned by the Virginia Company. About the middle of July they were ready to set forth. Their story says: 'And the time being come that they must depart, they were accompanied with most of their brethren out of the city, unto a town sundry miles off, where the ship [*Speedwell*] lay ready to receive them. So they left the goodly and pleasant city, which had been their resting-place near 12 years; but they knew they were pilgrims, and looked not much on those things, but lift up their eyes to the heavens, their dearest country, and quieted their spirits.' Winslow said of this parting: 'I persuade myself that never people upon earth lived more lovingly together and parted more sweetly than we the church at Leyden did.' They went forth, as Bradford says, with 'a great hope and inward real

of laying some good foundation, or at least to make some way thereunto; yea, though they should be but even as stepping-stones unto others for the performing of so great a work.' And 'the place they had thoughts on was some of those vast and unpeopled countries of America, being devoid of all civil inhabitants, where there are only savage and brutish men, which range up and down, little otherwise than the wild beasts of the same.' So, about 1621, July 22, nearly half of Robinson's church took ship at Delf Haven, on the *Speedwell*, and made a quick voyage to Southampton, where the *Mayflower* lay, with others of the intended colony, including some Leyden people who had been conducting matters in England, some English friends of like mind, and some strangers who were mere adventurers. It had been resolved at Leyden that Robinson should stay or go with the majority, and that Brewster, chosen as elder to the office of assistant minister, should lead the minority. Brewster was thus the minister, guide, and adviser of the Pilgrim band. A start was made about Aug. 5, with the two ships, but on account of trouble with the smaller ship a stop was made, Aug. 13–23, at Dartmouth, and on going thence to 'above 100 leagues without the Lands End,' more trouble caused a return to Plymouth, the giving up of the second ship, and reduction of the number to 102 persons besides the sailors, after which a final start was made, Sep. 6, for a voyage of 66 days, in which they 'met with many contrary winds and fierce storms,'—'boisterous storms in which they could bear no sail, but were forced to lie at hull many days together,'—and 'after long beating at sea' reached land, Nov. 9. Winslow says of the voyage: 'Being pestered nine weeks in this leaking, unwholesome ship, lying wet in their cabins, most of them grew very weak, and weary of the sea.' From the first land seen, north of Cape Cod, they sought 'to stand southward to find some place about Hudson's river, according to their first intentions,' but were forced to put back, and make a harbor, Nov. 11. 'This day,' says their record, 'before we came to harbor, observing some not well affected to unity and concord, but gave some appearance of faction, it was thought good there should be an association and agreement that we should combine together in one body, and to submit to such govt. and govs. as we should by common consent agree to make and choose.' A formal compact to this effect—a strong and simple model for the constitution of a self-governing civil state, the earliest framed in the new world and almost unique in history—was signed by 41 men, representing 100 persons (one of them an infant born at sea, where also one, a servant, had died). The office of first gov. was intrusted to John Carver, who had notably led in the earlier conduct of affairs, and was esteemed a goodly gentleman among them.

Arriving in harbor, as instantly as possible 15 or 16 men, well armed, landed, 'with some to fetch wood' for fires —no wood being left on the ship. This was Saturday; and Monday, Nov. 13, their shallop, which had been cut down to go between decks, and 'was much opened with

the people's lying in her,' was unshipped for repairs, which took 16 or 17 days. Not waiting for this, 16 men well armed under Capt. Standish, a good soldier who had joined them in Holland, set out Nov. 15 for three days of exploration by land. The record of their outlook here is in these words: 'Being thus passed the vast ocean, which way so ever they turned their eye, save upward to the heavens, they could have little solace or content in respect of any outward objects. For summer being done, all things stared upon them with a weather-beaten face; and the whole country, full of woods, and thickets, presented a wild and savage hue. If they looked behind them, there was the mighty ocean which they had passed, and was now as a main bar and gulf to separate them from all the civil parts of the world.' The second effort of exploration was made with the shallop, in which about 24 men and 10 seamen made a coastwise trip in the last days of Nov. and first of Dec. Much foul weather then came, with no prospect yet of a place to land; and ten of the principal men, with six seamen, started Dec. 6 on another exploration up the coast. 'The weather,' says Bradford, 'was very cold; it froze so hard as the spray of the sea lighting on their coats, they were as if they had been glazed.' The second day some went by land and some by sea, meeting at night at a creek's mouth, where they built, as they did every night, a defense of logs, stakes, and pine boughs The next morning, Dec. 8, they suffered their first attack from savages, almost a surprise, but came away in safety for a last terrible day on the wintry sea. The weather was foul, with snow and rain; about mid-afternoon the wind increased and the sea became very rough; their rudder was broken in the storm and two men with oars could hardly steer the shallop. The storm growing more violent and night drawing on, they bore what sail they could to get in somewhere while they could see. But now the mast was broken into three pieces, and the sail carried overboard, in a sea which ran so high that they were in peril of being cast away; only, the flood tide being with them, they recovered themselves and struck into what seemed a harbor, but proved a cove full of breakers, out of which they barely escaped by pulling about and rowing desperately through the extreme darkness and a raging sea, the rain beating furiously on them, until they struck under the lee of a shore where they could lie until day broke, Dec. 9, revealing the island in Plymouth harbor known later as Clark's Island. It was a fair sunshiny day, secure from savages, and a Saturday, permitting them to dry their clothing, to put in order their guns, and to rest, and then to keep their Sabbath, Dec. 10. Monday (Dec. 11 of their reckoning, 21 of ours) they 'sounded the harbor and found it fit for shipping,' says Bradford; 'and marched into the land and found divers cornfields and little running brooks, a place (as they supposed) fit for situation; at least it was the best they could find, and the season and their present necessity made them glad to accept of it. So they returned their ship again with this news to the rest of

their people, which did much comfort their hearts.' In their absence Gov. Bradford's wife had been drowned Dec. 7, one of four deaths while the ship lay at Cape Cod. 'On the 15th of Dec.' (our 25th), as Bradford relates, 'they weighed anchor to go to the place they had discovered, and came within two leagues of it, but were fain to bear up again; but the 16th day [our 26th] the wind came fair, and they arrived safe in this harbor. And afterwards took better view of the place, and resolved where to pitch their dwelling; and the 25th day began to erect the first house for common use to receive them and their goods.' They built with logs, with clay mortar in the chinks between them, and with roofs over which a cover of thatch was put. To make the common house, about 20 ft. square, 'some should make mortar, and some gather thatch,' says the record, 'so that in four days half of it was thatched.' Dec. 28, 'so many as could went to work on the hill, where we purposed to build our platform for our ordnance'—a combination of meeting-house and fort, with a place of assembly under a flat roof on which the artillery were mounted, guns 3 to 4 inches bore, with some smaller ones. Between the hill and the harbor they laid out ground for 19 families, into which all were distributed. The record says: 'We thought this proportion was large enough at the first, for houses and gardens to impale them round, considering the weakness of our people, many of them growing ill with colds; for our former discoveries in frost and storms, and the wading at Cape Cod [their only way to reach shore], had brought much weakness amongst us, which increased so every day more and more, and after was the cause of many of their deaths.' A letter of later date, 1621, Dec. 11, says of the building plans carried out: 'We have built seven dwelling-houses and four for the use of the plantation, and have made preparation for divers others.' The same letter shows that they used oiled paper for their windows. Jan. 9 they began to build houses on either side of 'Leyden' street, as the name came to be. Jan. 14 the common house, which was used as a general rendezvous, took fire, 'by a spark that flew into the thatch and burned it all up; but the roof stood, and was little hurt.' 'The most loss,' says the record, 'was Master Carver's and William Bradford's who then lay sick in bed, and if they had not risen with good speed had been blown up with powder. The house was as full of beds as they could lie one by another, and their muskets charged.' It was on a Sabbath morning, about 6, when the tide was down, and those on the ship, which had to lie nearly a mile and a half from the shore, could not get to land. They had planned to keep their Sabbath for the first time on shore, 'because now there was the greater number of people.' A week later, Jan. 21 (our 31), the record says, 'We kept our meeting on land.' It was six full months from their taking ship at Delft Haven. Jan. 19 they made plans 'to build a shed to put our common provisions in, of which some were already set on shore;' and the next day, Saturday, 'made up our shed for our

common goods.' The Lord's Day, Jan. 21 (our 31) was the first day that saw all together on land. Monday, 22, 'we wrought on our houses, and in the afternoon carried up our hogsheads of meal to our common storehouse.' The next Monday, Jan. 29, the long boat of the ship and their own shallop 'brought our common goods on shore.' Lord's Day, Feb. 4, the worst storm of any they saw fell on them, wind and rain with great violence, badly washing the clay out of the interstices of their thatched log-cottages, and imperilling those still on the ship, which was light because all the goods had been got on shore. Friday, Feb. 9, the story says, 'our little house for our sick people was set on fire by a spark that kindled in the roof; but no great harm was done.' It is not until Mar. 21 (our 31) that the ship was no longer the home of any of the company. 'This day,' the record says, 'with much ado we got our carpenter, that had been long sick of the scurvey, to fit our shallop to fetch all from aboard.' On four days, Feb. 17, Mar. 16, 21, and 22, meetings for 'establishing military orders' were interrupted by the appearance of savages; and Feb. 21 they got three larger and two smaller guns mounted on the hill. The first of the meetings named got so far as to elect and commission Miles Standish captain of the common command, and Mar. 23 a fifth meeting finished the business, and also re-elected Carver governor.

The next record is: 'Mar. 24 dies Elizabeth the wife of Mr. Edward Winslow. N.B. This month 13 of our number die. And in three months past dies half our company; the greatest part in the depth of winter, wanting houses and other comforts, being affected with the scurvey and other diseases, which their long voyage and unaccommodate condition brought upon them; so as there die sometimes two or three a day. Of a hundred persons scarce fifty remain; the living scarce able to bury the dead; the well not sufficient to tend the sick, their being, in their time of greatest distress, but six or seven sound persons, who spared no pains, night nor day, but with abundance of toil and hazard of their own health, fetched them wood, made them fires, dressed them meat, made their bed, washed their loathesome clothes, clothed and unclothed them. Two of these seven were Mr. William Brewster, their reverend Elder, and Miles Standish, their Captain and military commander, unto whom myself and many others were much beholden in our low and sick condition. And what I have said of these I may say of many others who died in this general visitation, and others yet living, that whilst they had health, yea, or any strength continuing, they were not wanting to any that had need of them.' The exact record of deaths was: 6 in Dec., of which 4 at Cape Cod; 8 in Jan.; 17 in Feb. (4 on the 21st); 13 in Mar.; and before a ship came from England (1621, Nov.) 6 more had died, making 50 deaths, and leaving 50 survivors (not counting births) to enter on the second year of the colony's struggle for existence. Of the 41 men who signed the compact only 20 were left at the end of March, including

Gov. Carver, whose death followed very soon; and of these 20, the wives of four, Bradford, Standish, Allerton, and Winslow, had died, besides 19 women, children, and servants, whose names are not given; and Mrs. Carver's death followed her husband's. The *Mayflower* sailed back Apr. 5, and arrived in England May 6, but none thought of return, and 'the spring advancing it pleases God the mortality begins to cease, and the sick and lame recover; which puts new life into the people, though they had borne their sad affliction with as much patience as any could do.' The 'answerable courage' to make sure of a founding, even though, as they had said beforehand, 'they should be but even as stepping stones unto others for the performing of so great a work,' in 'some of those vast and unpeopled countries of America,' was shown by their burial, in that winter of deadly plague, of the 40 who fell in three months, not on the future burial hill, but on the lower brow close to the rock of landing, smoothing down the surface over the graves to conceal from the spying savages the fact that the colony was wasting away. The burials probably at night, the coffinless dead borne forth on the rude bier of the wilderness, illustrate the pathetic heroism of such holding by seven men of the gate of a continent, as they gave warrant for a word sent from England, 1623, Apr.: 'Let it not be grievous unto you that you have been instruments to break the ice for others who come after you; the honor shall be yours to the world's end.'

Famine was in the first years not the least of their difficulties. In 1622 they were six months on half allowance, and then in June their stores were gone and the people famishing. They could not, for lack of nets, take the bass plentiful in the outer harbor, nor, for lack of deep-water tackle, the cod in the bay. Game and ground nuts were not in season. They had no meat, bread, or vegetables. Even when Winslow went on a coast trip to gather a little food, it gave but 4 oz. a day of bread. Worse famine still befell in 1623 about planting time; and the only relief was the uncertain fishing. Yet with a meagre wooden platter of boiled clams Elder Brewster failed not to give thanks that they 'were allowed to suck of the abundance of the seas and of the treasures hid in the sand.' No troubles ever overcame their cheerful courage. They numbered, after four years, only about 180 persons and 32 families, but their conquest of a good foundation for all generations to come was secure, and in four years more, Endicott's company at Salem, 1628, Sep., and Higginson's, 1629, May, followed by the great band under John Winthrop, began the coming, direct from England, of the more than 20,000 people, in 300 ships, which within less than a quarter of a century from the Pilgrim landing, made New England, except in the Old Colony, and in the Rhode Island of Roger Williams (a Rigid Separatist, rigorous in independence, but lacking the broad Pilgrim liberality), a land of the church-and-party Puritans.

The ardor of Robinson and his remaining people at Leyden to follow Brewster's company to their refuge in the

wilderness, was not dampened by any report of troubles; but church-Puritan stockholders in London gave way to spleen against the liberal independency, the non-ecclesiastical basis, of the Leyden people, and as much as possible kept them from a chance to go. In the weary waiting Robinson died, 1625, Mar. 1, and three years later, to overcome finally the trouble, after two detachments had come, 1621, Nov., and 1623, Aug., without the pastor or the main church body, a scheme was formed at Plymouth, by which 8 of the chief there bought out the London stockholders, paying £200 a year for 9 years, from 1628, and assuming £600 of colony debts. The communism thus far existing in the colony had been forced on them from London, and was as soon as possible done away.

The Pilgrim church at Plymouth had a varied experience of pastors not to their mind, but generously entertained, without question of differences. Brewster, who survived about 23 years, was their true minister, though not ordained ecclesiastically; and their custom of meeting was for brethren, of whom many were able and instructed, to take part after the sermon in speaking, on the principle known to them and urged by Robinson, as 'the liberty of prophesying.' Their formal order never stood before the world as it would have done if Robinson had lived with them as long as Brewster did; but the fine and lofty spirit which was peculiar to them, their genius for broad humanity, their rule of liberal independency, have come at last to wide prevalence in the English America which they planted.

See CONGREGATIONALISM : CROMWELL, OLIVER : PURITANS.

PILI, n. plu. *pī'lī* [L. *pĭlus*, hair]: in *bot.*, fine slender hair-like bodies covering some plants. PILIFER, a. *pĭl'-ĭ-fĕr*, or PILIFEROUS, a. *pĭl-ĭf'ĕr-ŭs* [L. *fero*, I bear]: in *bot.*, covered with hair. PIL'IFORM, a. *-fawrm* [L. *forma*, shape]: resembling hairs.

PILL, v. *pĭl* [from PILL 3]: in *slang*, to black-ball a candidate at a club; to reject by an adverse vote. PILL'ING, imp. PILLED, pp. *pĭld.*

PILL, v. *pĭl* [W. *pilio*, to peel or skin; *pîl*, peel, rind: Dan. *pille;* Norw. *pila*, to pick: F. *piller;* L. *pilārĕ*, to make bare or bald]: in *OE.*, to take off the rind or outer covering; to peel; to strip; to rob; to extort; to plunder.

PILL, n. *pĭl* [F. *pilule*, a pill—from L. *pĭlŭla*, a little ball—from *pĭla*, a ball]: medicinal substance formed into the shape and size of a pea, to be swallowed whole; anything nauseous: v. to form into pills; to dose with pills. PILL'ING, imp. PILLED, pp. *pĭld.* PILL-MASS, the stiff paste or medicated compound out of which pills are formed. PILULE, n. *pĭl'ūl*, a small or diminutive pill. —*Pills* are formed from masses of consistence sufficient to preserve the globular shape, yet not so hard as to be of difficult solution in the stomach and intestines. This form is especially suitable for (1) all remedies which operate in small doses, e.g., metallic salts; (2) those designed to act slowly and gradually, e.g., some alteratives; (3) those too readily soluble when exhibited in other forms; (4) substances whose operation it is desirable to retard until they have reached the lower intestines, as in some remedies, for habitual costiveness; (5) substances whose specific gravity is too inconsiderable to allow their suspension in aqueous vehicles; and (6) fetid substances: while it is unsuitable for (1) medicines which require to be given in large doses; (2) deliquescent salts; (3) fluid or semi-fluid substances, e.g., oils, balsams, etc., which require a very large proportion of some dry powder to render them sufficiently tenacious to form into a mass; (4) substances so insoluble, that when exhibited in solid form they pass through the intestinal canal unaltered, e.g., extract of logwood. Many substances, e.g., vegetable extracts, may be formed into pills at once without any addition; but most substances require the addition of a material termed an excipient, for converting it into a pill-mass. The excipients in most common use are bread-crumbs, hard soap, extract of licorice, mucilage syrup, treacle, honey, castor-oil, and conserve of roses. For the property of preserving pills for a long time in a properly soft state, the most valuable excipient is the conserve of red roses; perhaps next to it treacle is the most valuable excipient, as it does not undergo any change by time, but maintains a proper consistence, and preserves the properties of vegetable powders unimpaired for years. It is common to place pills in some fine powder, to prevent them from adhering to each other, and to conceal their taste. For this purpose,

licorice powder, wheat flour, starch, and magnesia are generally used, also lycopodium. They may also be coated with sugar or chocolate. Pills retain their moisture and activity far longer in little bottles than in the ordinary pasteboard boxes. If the weight of a pill much exceeds five grains, it is too bulky to swallow conveniently if it consist of vegetable matter. Patients who express their inability to take this form of medicine, can soon overcome the difficulty if they practice with a small globular mass toward which they feel no repugnance, as a pellet of bread or a currant—placing it on the back of the tongue, and gulping it down with water. The disadvantage of pills is that, after keeping for some time, they may become insoluble in the juices of the stomach and intestines, and so pass through the body undissolved. Only freshly made pills should be used.

PILLAGE, n. *pĭllāj* [F. *pillage*, pillage—from *piller*, to rob: Sp. *pillar*, to plunder: It. *pigliare*, to seize: Dan. *pille*, to pick (see PILL 2)]: plunder; spoil; that which is taken in war; the act of plundering: V. to strip of money or goods by violence; to plunder. PILLAGING, imp. PIL'LAGED, pp. *-lājd*. PIL'LAGER, n. *-lā'jĕr*, one who pillages.—SYN. of 'pillage, n.': plunder; rapine; booty; spoil; prey.

PILLAR, n. *pĭl'lĕr* [F. *pilier;* Sp. and Port. *pilar*, a pillar—from mid. L. *pilārĕ*, a pillar—from L. *pīla*, a pillar]: a column of any shape to support (see below): anything that sustains or upholds; a foundation; a support; in *personal sense*, a supporter. PIL'LARED, a. *-lĕrd*, PIL'LARISTS (see PILLAR SAINTS).

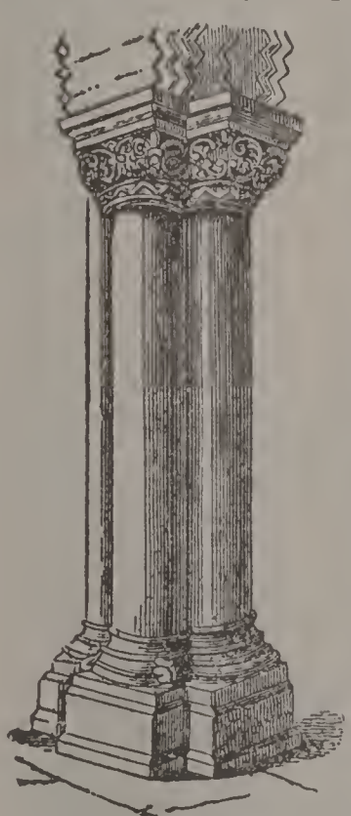


Fig. 1.—Norman Clustered Pillar.

PIL'LAR: detached support like a column; but its section may be of any shape, whereas the column is always round. Pillars have been used in all styles of architecture, and their forms and ornaments are usually among the most characteristic features of the style. The Greek and Roman pillars (or columns) are the distinguishing elements in the various orders. In Gothic architecture, also, the pillars are of different forms at the various epochs of that style. First, in the Norman period, are plain massive pillars, square, circular, and octagonal, frequently ornamented with zigzag ornaments, spiral bands, etc., on the surface (fig. 1). As vaulting was developed, the system of breaking the plain surface, and giving to each portion of the vaulting a separate little column or shaft to support it was introduced. This was done either

by attaching shafts to the circular pillars, or by cutting nooks in the pillar and setting little shafts in them: *a*, *b*, fig. 2.—In the Early Pointed Style a plain circular or octagonal pillar, with a number of small shafts attached around it, is a favorite arrangement: *c*, *d*, fig. 2.—In this style, the attached shafts are very frequently banded to the main pillar at different heights, and they are sometimes made of finer material, such as Purbec marble.—In the Decorated

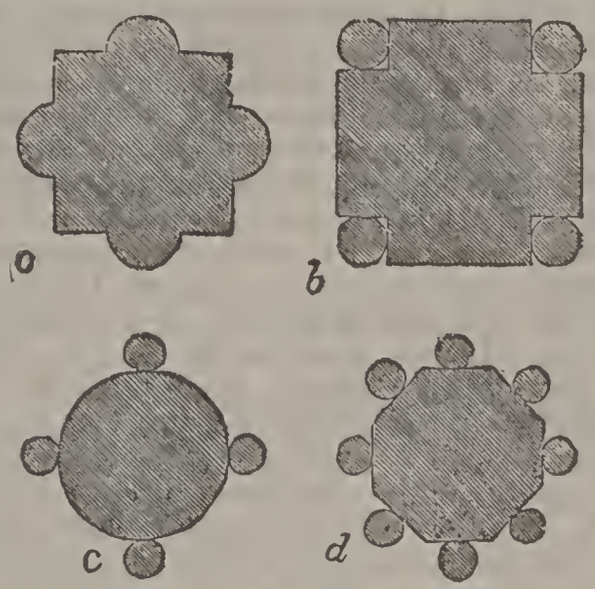


Fig. 2.

Style the pillar is of lozenge form, and not so much ornamented with detached shafts as with moldings; plain, circular, or octagonal pillars, however, are used in this, as in all the styles. The moldings and shafts are usually filleted; and some of the moldings run up into the arch without any cap.—In Perpendicular the same idea is carried further; the moldings become thinner, and are more frequently run up into the arch without caps. See FLAMBOYANT.

PILLAR SAINTS; called also 'STY'LITES' [Gr.—from *stylos*, a column] 'Pillarists,' 'Holy Birds,' 'Air Martyrs,' and several similar names: remarkable class of anchoretical Ascetics (see ASCETICISM), chiefly of Syria, who, with a view to separating themselves more completely from earth and fellow-men, took up their abode on the tops of pillars, on which they remained without ever descending to earth, and exposed to all the variations of a Syrian climate. The earliest of them, and the most celebrated, Simeon (called also Simon) the Stylite, had been a monk, and had lived, in the beginning of the 5th c., in extreme seclusion in his monastry for nine years, without ever moving from his narrow cell. Increasing in enthusiasm, he withdrew to a place about 40 m. from Antioch, where he built a pillar, on the top of which, only a yard in diameter, he took up his position. From this pillar he removed to several others in succession, each higher than its predecessor, till at last he attained to 40 cubits, or about 60 ft., in height. In this mode of life he spent 37 years, his

neck loaded with an iron chain, and his lips engaged in constant prayers, during the recitation of which he bent his body so that his forehead touched his feet. His powers of fasting were no less marvellous; he is said to have frequently limited himself to a single meal in the week, and during the 40 days of Lent to have abstained entirely from food. The fame of his sanctity brought crowds of pilgrims from the most distant countries, even Britain itself, to see him; and the admiration of his austerities is said to have converted many pagans and Saracens to the church. In trial of his virtue, through the test of humility, some neighboring monks reproaching him with vanity, and the love of novelty in this extraordinary mode of life, ordered him to come down from his pillar. Simeon prepared without hesitation to comply, and the compliance was accepted as evidence of his perfect humility and holiness of purpose. It is said that in consequence of an ulcer which was formed on one of his legs, he was obliged for the last year of his life to remain on his pillar upon one foot. In this position he died in 460, aged 72 years. A disciple of Simeon, named Daniel, succeeded to his reputation for sanctity; and to his mode of life, which he maintained 33 years, in the still more trying climate of the shores of the Bosporus, about 4 m. from Constantinople. The marvels of Daniel's career are still more startling. He was sometimes almost blown by the storms of Thrace from the top of his pillar. At times for days together he was covered with snow and ice. How he sustained life, what nourishment he took, was a mystery even to his disciples. The emperor at length insisted on a covering being placed over the top of the pillar, and Daniel survived till the year 494. In Syria there were many pillar saints as late as to the 12th c.; but in the west, Daniel is almost a solitary example. A monk named Wulfailich, near Trier, attempted the pillar-life in the 6th c., but the neighboring bishops compelled him to desist, and destroyed his pillar.

PILLAU, *pĭl'low:* fortified town in E. Prussia, at the entrance of the Frische Haff to the Baltic Sea. It has a good harbor, and is the port of Königsberg (q.v.) 25 m. distant, with which it has railroad connection, and a large river commerce in summer. It is the port also of Elbing and Braunsberg. Pop. about 3,200.

PILLAW, or PILLAU, n. *pĭl-law'* [Turk. *pilaw*]: a Turkish dish, consisting of rice cooked with fat, butter, or meat.

PILLIBHIT, *pĭl-lē-bēt*, or PHILLIBIT, *phĭl-lē-bēt':* town of India, in the N.W. Provinces; 28 m. n.e. by e. from Bareilly. It has considerable trade. Pop. 29,721.

PILLION, n. *pĭl'yŭn* [Gael. *pillean*, *pillin*, a saddle-cloth—from *peall*, a skin: Sp. *pillon*, a skin: comp. W. *pilyn*, a clout, L. *pellis*, a skin]: a cushion for a woman to ride on behind a horseman; a soft low saddle; the pad or cloth below a saddle next the horse's back.

PILLNITZ, *pĭl′nĭts:* palace and ordinary summer residence of the royal family of Saxony, in a beautiful situation seven m. s.e. of Dresden. The grounds are finely diversified, and the walks ascend to the summits of hills, of which one is nearly 1,000 ft. high. P. acquired historic interest from the meeting of princes in the castle 1791, Aug., when the Declaration of P. was framed, according to which Austria and Prussia agreed to declare the condition of the king of France (then a prisoner in the Tuileries, after his ineffective flight to Varennes) a matter of common interest to the sovereigns of Europe, and to express the hope that common cause would be made for his restoration. The emperor and the king of Prussia were resolved to use force to effect this result; but any immediate interference on their part was rendered unnecessary by Louis's acceptance of the constitution as modified by the national assembly, after which he was again placed on the throne.

PILLORY, n. *pĭl′-lŭr-ĭ* [F. *pilori*, the pillory, a name formerly given in France to a ruff or collar worn by women around the neck, like the board of the pillory; prov. F. *espillori*, the pillory: Sp. *espillera*, a loop-hole, a little window: mid. L. *pillor′ĭcum, spiliorium:* according to Wedgwood, various derivations have been suggested, of which most plausible is Fr. *pilier*, from the pillar or post at which the criminal is compelled to stand]: scaffold, on which was erected a post or pillar surmounted by a flat board pierced with holes for the head and hands of the offender, who stood in an upright position, with his hands and head jutting out on one side of the flat board: V. to punish with the pillory. PILLORYING, imp. *pĭl′ŏr ĭ-ĭng:* N. placing in the pillory; punishing by the pillory. PIL′LORIED pp. *-ĭd:* ADJ. put in a pillory.—The *Pillory* was an engine for the public punishment of criminals, disused in Britain since 1837; but previous to that time commonly employed, as it also was in France and Germany. It consisted of a stout plank fixed like a sign-board on top of a pole, the pole itself being supported on a wooden platform elevated from the ground. Above, and parallel to this plank, another of similar dimensions was placed in a similar position with respect to the pole, and fixed to the former by a hinge at one end, being thus capable of being moved upward from it, or closed upon it, when necessary. A large circular hole is cut, with its centre in the line of junction of the two planks, and two corresponding holes of smaller size are formed, one on each side of it; the large hole is for receiving the neck, the two smaller for the wrists. When a criminal is to be placed in the P., he is made to mount and stand upon the platform; the upper of the two hinged planks is raised to allow the culprit's neck and wrists to be inserted in their proper grooves, and then brought down into its place, and fastened by a padlock, or in some other way. (See OATES, TITUS.) The P. seems to have been used in England before the Conquest, in the form of the stretch-neck (an instrument by which the neck only was confined), and was originally intended, according to the

'Statute of the Pillory' (51 Hen. III. c. 6), for 'forestallers, users of deceitful weights, perjury, forgery, etc.,' and all such dishonorable offenses. Its use was exclusively confined to this class of offenders till 1637, when restrictions were put on the press, and all who printed books without a license were put in the P. From this time it became the favorite mode of punishing libellers (or those who were considered such by the government), authors and publishers of seditious pamphlets, or of strictures on the government; and many eminent men were accordingly from this time put 'in and on the pillory,' e.g., Leighton, Lilburn and Warton, the printers, Prynne, Dr. Bastwick, Daniel Defoe, etc. The insufficiency of the P. as a means of inflicting a definite amount of punishment became apparent; for to those who were popular favorites it was no punishment at all, while those who were objects of popular dislike were ill-used to such an extent as occasionally to cause death. The sufferers above mentioned being popular favorites, or having at least numerous supporters, were shaded from the sun, fed, and otherwise carefully attended to; while the encouragement, applause, and sympathy of the crowd around converted the intended punishment into a triumph; but such men as Titus, Oates, and the class of offenders including perjurers, swindlers, polygamists, etc., who were objects of popular hatred and disgust, were pelted with rotten eggs (the favorite missile), garbage, mud, sometimes even with more dangerous missiles. In 1814 the celebrated naval hero Lord Cochrane (see DUNDONALD, EARL OF) was sentenced to the P.; but the government of the day was not prepared to brave the consequences of such an act, and the sentence was not carried into effect. In France the P. was called anciently *pilori*, and in recent times *carcan*, from the iron collar by which the criminal's neck was attached to the post: punishment by this mode was abolished in that country 1832.

PILLOW, n. *pĭl'lō* [AS. *pyle:* Dut. *peluwe* or *puluwe*, a pillow—from L. *pulvīnus*, a cushion: L. *pluma;* W. *plu*, feathers]: a cushion or bag for the head to rest on in bed, usually filled with feathers; something that bears or supports: ADJ. applied to a kind of lace, because made on a pillow or cushion: V. to rest or lay on for support. PIL'LOWING, imp. PIL'LOWED, pp. *-lōd:* ADJ. supported by a pillow. PIL'LOWY, a. *-lō-ĭ*, resembling a pillow; soft. PILLOW-BLOCK, in *mech.*, a block or standard hollowed for supporting the end of a shaft. PILLOW-CASE, or PILLOW-SLIP, the covering for a pillow.

PILLOW, *pĭl'lō*, GIDEON JOHNSON: soldier: 1806, June 8—1878, Oct. 6; b. Tenn. He graduated from the Univ. at Nashville 1827, became a lawyer and practiced at Columbia, Tenn.; was influential in securing the nomination of James K. Polk for the presidency 1844; served with great distinction in the Mexican war, and was promoted maj.gen. 1847. He had a disagreement with Gen. Scott, who charged him with insubordination; but he was acquitted by a military court of inquiry called at his own request. He represented the conservative element at the

Nashville Southern convention 1850, and was a prominent candidate for nomination as vice-pres. at the democratic national convention 1852. He engaged heartily in the Confederate service 1861, raised and organized troops, was appointed maj.-gen., declined the chief command at Fort Donelson, and fled thence to avoid surrender. Later he served under Gen. Beauregard.

PILLSBURY, *pĭlz'bĕr-ĭ*, AMOS: 1805–1873, July 14; b. N. H. For many years he was warden of the Conn. state prison, was in charge of prisons in other states, and for a while was supt. of the New York police force. The form and arrangement of the penitentiary at Albany were largely according to his plans, and he was long in charge of the institution. He was a member of the London prison congress 1872, was a strict disciplinarian, and was successful in prison management.

PILLSBURY, JOHN SARGENT: b. Sutton, N. H., 1828, July 29; d. Minneapolis, Minn., 1901, Oct. 18. He removed to the West in 1854, and in 1872 became a flour manufacturer in Minneapolis; this business in his hands grew to large proportions. During the Civil war he organized three regiments for the Northern army. In 1863 he was elected to the state senate, and several times reelected, and in 1875–77 he was governor of Minnesota. He was interested in the progress of education and for many years was a regent of the State University.

PILLSBURY, PARKER: reformer: b. Hamilton, Mass., 1809, Sep. 22; d. Concord, N. H., 1898, July 7. He studied theology and for a short time preached in New London, N. H. From 1840 till slavery was abolished he was employed by anti-slavery societies as an abolitionist lecturer, and as editor of several of their publications. He afterward was connected with the woman-suffrage movement, edited the *Revolution* 1869–70, and also preached for various free religious associations. His publications include the *Acts of the Anti-Slavery Apostles* (1883), and numerous pamphlets.

PILOSE, a. *pī'lōs*, or PILOUS, a. *pī'lŭs* [L. *pilōsus*, hairy, shaggy—from *pilus*, hair]: in *bot.*, covered with long distinct hairs, abounding in hairs. PILOSITY, n. *pī-lŏs'ĭ-tĭ*, the state of being covered with hairs.

PILOT, n. *pī'lŏt* [It. *pilota;* F. *pilote*, a pilot; Dut. *pijlloot*, a pilot—from *peilen*, to sound the depths; *loot*, to lead, direct: comp. Gael. *peilloth*, a plummet]: *literally*, one who conducts a vessel by the sounding line; one whose occupation is to steer ships into and out of a harbor or along a dangerous coast (see below): a guide: V. to steer; to guide or direct, as a pilot; to guide through dangers and difficulties. PI'LOTING, imp.: N. the act of steering a ship; a directing; direction. PI'LOTED, pp. PI'LOTAGE, n. *-āj*, the fee or wages paid to a pilot; the act of piloting. PILOT-FISH (see below). PILOT-BOAT, a boat used by pilots for reaching ships. PILOT-CLOTH, a stout, blue, woolen cloth, used for

greatcoats and for the clothing of seafaring people, and others. PILOT-ENGINE, on a *railway*, an engine sent before to clear the line, as before an advancing train, or as an attendant on a train containing great personages. PILOT-JACK, a union or other flag hoisted by a vessel for a pilot. PILOT-JACKET, a pea-jacket, which see.

PI'LOT: person specially deputed to take charge of a ship while passing through a particular sea, reach, or dangerous or intricate channel. The intricacy of almost all coast navigation renders it impossible that any navigator, however skilful, can be master of all the waters into which he may have to sail his ship; and the risk of disaster, through ignorance of local dangers, is therefore avoided by transferring the direction of the ship's course to some one perfectly acquainted with the spot. The man to whom so much is intrusted must be a responsible person, and therefore in all countries qualified sailors are officially licensed to act as pilots in their districts, and they are granted the monopoly. The laws of Wisby, promulgated at least as early as the 14th c., subsequently incorporated in nearly every maritime code, render it compulsory on the master of a ship to employ a P. when sailing near a coast.

In the United States, the regulation of P. service is left by congress to the several states, whose governments, through P. commissioners or similar officers, fix the conditions on which license shall be granted to pilots, and the offenses or derelictions that will work its cancellation or suspension, the states determine also the charges which pilots may lawfully make for their services. A ship-master is usually required to accept the services of the first pilot boarding him; reciprocally, the P. is generally required to obey the call of the ship-master. Having taken the helm, the ship is navigated under the orders of the P. which, however, are, constructively, the master's orders, for the master does not relinquish his place: in the eyes of the law, as interpreted by U. S. courts, the owners of a vessel that meets with disaster while under the orders of a P. are responsible to shippers for any loss incurred by them. The license of the P. may be revoked for misconduct or inefficiency, and his fee (pilotage) forfeited; it is an open question whether he can be held liable for the damages resulting from his acts or his negligence.

By British law, the command of the vessel, except in matters of discipline, is vested entirely in the P., who can use his discretion as to the sails, steering, etc., of the ship until the limit of the pilot's district is passed, except that the captain resumes his powers when the question of taking a place in a harbor is concerned. The general rule as to the responsibility of the owners of the ship is, that no owner or master of a ship is answerable to any person whatever for any loss or damage occasioned by the fault or incapacity of any qualified pilot acting in charge of such ship within any district where the employment of the pilot is compulsory.

In the navies of some countries the pilot is a permanent officer of the ship, and has charge of her course, but his

functions in that case approach nearer to those of the British navigating officer. Large French vessels have often several sailing pilots called *pilotes hauturiers*, and a *pilote côtier* or *lamaneur*. The ancient laws of France contained provisions for education and regulation of both these classes.

PILOT-FISH (*Naucrates ductor*): fish of the family *Scomberidæ*, and belonging to a section of that family in which the first dorsal fin is represented by mere spines, and there are no finlets behind the second dorsal and the anal fins as in the mackerel, etc. The shape of the P. is very similar to that of the mackerel. It is usually about 12 inches long; general color silvery grayish-blue, five dark-blue transverse bands passing round the whole body. Its flesh is very delicate, and resembles mackerel in flavor. It is common in the Mediterranean, and appears widely-diffused through warmer parts of the ocean, often following ships for a long time and very far, in which way it has been known to come from Alexandria in Egypt, to Plymouth, England. It is rare even on the s. coasts of Britain. It has been observed many times in the harbors of the United States. It is supposed to be the *Pompilius* of the ancients, which was believed to point out their desired course to sailors. It is often seen in the company of a shark, and is therefore commonly supposed to direct the shark to its prey. Concerning this many wonderful stories are found in the writings both of voyagers and of naturalists. It has been contended, on the other hand, that the

Pilot-fish (*Naucrates ductor*).

P. merely follows the ship in company with the shark for the same object that gulls follow the steamboats on our coasts—to feed on anything eatable that may fall or be thrown overboard; or that it attends the shark in order to seize small morsels of its large prey. The following statements of Dr. Bennett may be received with confidence: 'I have observed that if several sharks swim together, the pilot-fishes are generally absent; whereas, on a solitary shark being seen, it is equally rare to find it unaccompanied by one or more of these reputed guides. . . . The only method by which I could procure this fish was, that when capturing a shark I was aware these faithful little fishes would not forsake him until he was taken on board; there

fore by keeping the shark, when hooked, in the water until he was exhausted, or, as the sailors term it, "drowned," the pilot-fish kept close to the surface of the water over the shark, and by the aid of a dipping-net fixed to the end of a long stick I was enabled to secure it with great facility' (*Gatherings of a Naturalist*).—A much larger species of *Naucrates* is found on the coasts of S. America.

PILOT KNOB, *pī'lot nŏb:* conical hill in Iron co., Mo., about 6 m. below Iron Mountain. It is 3 m. in circumference at its base and rises 600 ft. The surface is a porphyry conglomerate interspersed with layers of ore, but the mass of the hill is an ore containing 53 to 60 per cent. of an excellent grade of metallic iron. The grain is very fine, the color a light gray, and the ore is very brittle. A small village, of the same name, inhabited principally by the iron-workers, has grown up in the vicinity.

PILOT MOUNTAIN: see ARARAT.

PILOTY, *pē'lo-tē*, KARL THEODOR VON: Bavarian historical painter: b. Munich, 1826, Oct. He studied at a number of the great art-centres in Europe; and made his first reputation 1852, by his picture of the *Establishment of the Catholic League*. This was followed by productions illustrating German and Roman history, of which his *Triumphal March of Germanicus* is a good example; also his *Death of Cæsar*. Another work is *Henry VIII. sentencing Anne Boleyn to Death*. At the death of Kaulbach, he was elected pres. of the Munich Acad. The frescoes of the Bavarian national museum were painted by his brother Ferdinand. He died 1886, July 21.

PILOUS: see PILOSE.

PIL'PAI: see BIDPAI.

PILSEN, *pĭl'sén:* town of Bohemia, in a fertile and beautiful valley at the confluence of the Mies and the Beraun, 52 m. w.s.w. of Prague. The Church of St. Bartholomew (built 1292), the town-hall, and the house of the Teutonic Knights are interesting Gothic edifices. The town contains a gymnasium and other educational institutions, an arsenal, theatre, and a number of churches and convents. P. has leather and cloth-factories, a great alum-work, iron and coal mines, and an important brewery. Pop. (1880) 38,883; (1890) 50,221; (1900) 68,079.

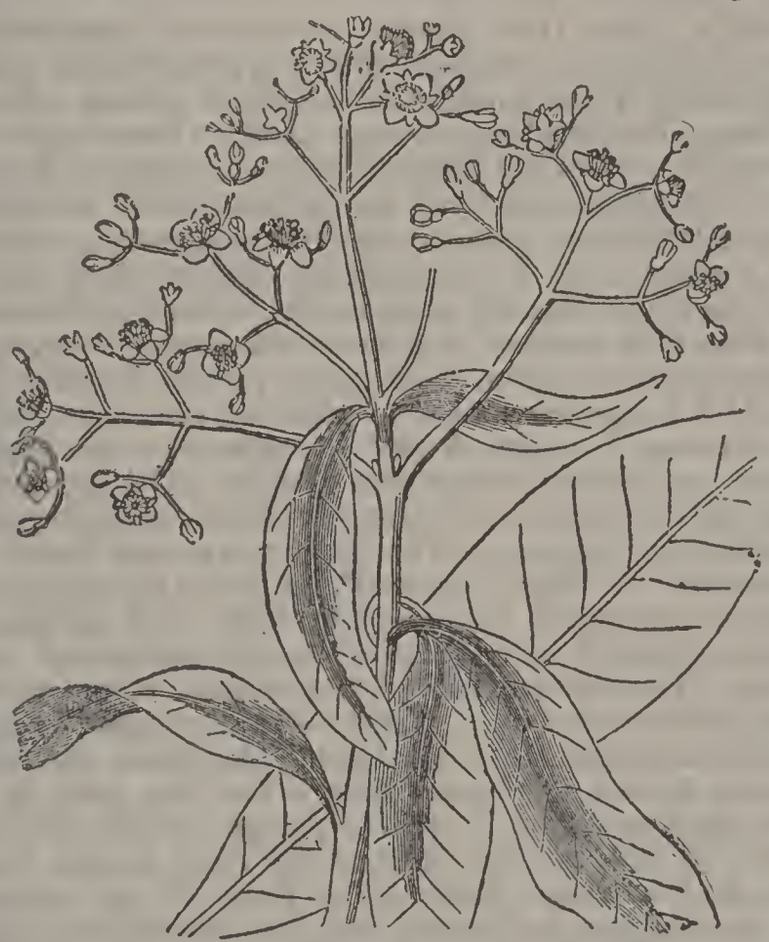
PILULE: see under PILL 1.

PIMAS, *pē'maz*, or NÉVOMES: non-nomadic family of N. Amer. Indians in Arizona and New Mexico, comprising the Pimas proper, the Opatas, Eudeves, and Joves, the Opatas being the most advanced tribe, readily adapting themselves to the customs of the whites and possessing mechanical ability. The P. proper call themselves Ohotama. They are more savage and superstitious than the Opatas, and addicted to vice and drunkenness. The P. in the United States are on a reservation of 64,000 acres set apart 1859, Feb. 28. In 1874 they numbered about 4,000, industrious and self-supporting. There were early Spanish missions among them, but the tribe is now assigned to the Reformed Church. 1899 there were 4,260.

PIMELIC, a. *pĭm-ĕl'ĭk* [Gr. *pimĕlē*, fat—from *piōn*, fat] applied to the products resulting from the action of nitric acid on fatty substances; an acid of the oxalic acid series.

PIMELITE, n. *pĭm'ĕ-līt* [Gr. *pimĕlē*, fat; *lithos*, a stone]: an earthy mineral of an apple or yellowish green color, with a dull lustre and greasy feel; a nickeliferous silicate.

PIMENTO, n. *pĭ-mĕn'tō*, or PIMEN'TA [Port. *pimenta;* Sp. *pimienta;* It. *pimento*—from L. *pigmentum*, coloring matter, thence the juice of plants]: allspice or Jamaica pepper, the dried berries of a W. Indian tree—the *Pimen'ta officĭnālis*, ord. *Myrtācĕæ*. PIMENT, n. *pĭ'mĕnt* [OF.]: spiced or honeyed wine.—*Pimento* (called also Allspice, or Jamaica Pepper) is the dried fruit of a small tree (see EUGENIA) which grows to the height of 20 or 30 ft. and has oblong or oval leaves about four inches long, of deep shining green, and numerous axillary and terminal trichotomous panicles



Pimento.

of white flowers, followed by small dark-purple berries. The P. tree is much cultivated in some W. Indian Islands. It is a very beautiful tree, with straight trunk and much branching head; and about the month of July is covered with an exuberance of flowers, which diffuse a rich aromatic odor. The leaves and bark partake of the aromatic property for which the fruit is valued. The fruit, when ripe, is filled with a sweet pulp, and the aromatic property, which so strongly characterizes it in its unripe state, has mostly disappeared. The gathering of the berries, there

fore, takes place as soon as they have reached their full size, which is about that of pepper corns. They are gathered by the hand, and dried in the sun on raised wooden floors; during which process great care is taken, by turning and winnowing, to prevent them from injury by moisture. Their color changes in drying, from green to reddish brown. When dry they are packed in bags for the market. Some planters kiln-dry them.—The name *Allspice* was given to P. from a supposed resemblance in flavor to a mixture of cinnamon, nutmeg, and cloves. P. is much used in cookery, also in medicine as a carminative and stimulant to prevent the griping of purgatives and to disguise the taste of nauseous drugs. It depends for its properties chiefly on a volatile oil, *Oil of P.*, obtained from it by distillation with water, and which is used sometimes to relieve toothache, and for making the *Spirit of P.* (or of *Allspice*) and *P.* (or *Allspice*) *Water* of the shops.

PIMP, n. *pĭmp* [OF. *pimpée*, tricked up—from *pĭmper*, to make spruce]: a man who provides gratification for the lust of others: V. to pander to the lust of others. PIMP'ING, imp. PIMPED, pp. *pĭmpt*. *Note.*—Littré says that F. *pimper* is a nasalized form of *piper*, to pipe, to deceive, to cheat; in which case PIMP is a spruce fellow, a deceiver.

PIMPERNEL, n. *pĭm'pĕr-nĕl* [OF. *pimpernelle;* It. and new L. *pimpinella:* F. *pimprenelle:* said to be a corruption of the Celtic Gaulish *pumpedu'la* or fire-leaf, the common *Potentilla reptans*, a plant having slender creeping runners, quinate leaves, and large yellow flowers, ord. *Rosăcĕæ*], (*Anagallis*): genus of plants of nat. ord. *Primulaceæ*, having a wheel-shaped corolla, and the capsule opening by division round the middle. The species are elegant little annual and perennial plants, natives chiefly of temperate climates. The flowers are not large, but very beautiful.—The SCARLET P. (*A. arvensis*) is common in Britain, occurring as a weed in fields and gardens; it is common also in most parts of Europe and many parts of Asia. The flowers are of fine scarlet color, with a purple circle at the eye. There is a common belief in England, mentioned by Lord Bacon, that when this plant opens its flowers in the morning a fine day may be expected; and they certainly close very readily on the approach of rain. They usually open about eight in the morning, and close about noon.—The BLUE P. (*A. cærulea*), is far less common in Britain, but very abundant in parts of Europe.—The BOG P. (*A. tenella*), frequent in bogs in England, is an exquisitely beautiful plant.—Several species are cultivated in flower-gardens.—Acrid properties prevail in this genus, and *A. arvensis* has been used medicinally in epilepsy, dropsy, and mania.—The name WATER P. is given to *Samolus Valerandi*, called also *Brookweed*, another plant of the same order, with racemes of small white flowers, growing in watery gravelly places. It is supposed to be the *Samolus* which Pliny says the Druids gathered fasting, with the left hand, and without looking at it, ascribing to it magical virtues in the cure and prevention of diseases in cattle. Its geographic distribution ex-

tends over almost all the world. The Scarlet Pimpernel is known in the United States as the Common Pimpernel naturalized from Europe. Besides the WATER PIMPERNEL or Brookweed, above mentioned, native to both continents, we have a variety *Americanus*, more slender, diffusely branched, with flowers smaller and more spreading; common in wet places, and flowering June—September.

PIMPINELLA, n. *pĭm'pĭn-ĕl'lă* [new L. *Pimpinella*]: a genus of plants, ord. *Umbellif ĕræ;* the garden-burnet.

PIMPLE,, n. *pim'pl* [AS. *pípel*, a pimple; W. *pwmp*, a blow, a round mass: a nasalized form of L. *pap'ula*, a pimple; Gr. *pomphos*]: a small red swelling on any part of the body. When the pimple contains matter, or pus, it is called a *pustule*. PIM'PLED, a. *-pld*, covered with or containing pimples. PIM'PLY, a. *-plĭ*, having pimples; pimpled.

PIN, n. *pĭn* [W. *pin;* Gael. *pinne*, a pin, a pen: Dut. *pinne*, a point: L. *Pinna*, a fin, a pinnacle]: short piece of wire pointed and having a head, much in domestic use for fastening articles of dress, etc. (see below): anything that holds parts together; a peg; a short shaft or bolt; the central part; a term expressive of little value, as, I don't care a pin; v. to fasten, as with a pin or pins; to make fast. PIN'NING, imp. PINNED, pp. pĭnd. PINNER, n. *pĭn'ĕr*, one who pins. PIN'TLE, n. *-tl*, a little pin; a long iron bolt. PIN-CASE, a case for holding pins. PINCUSHION, a case stuffed with a soft material, on which pins may be stuck ready for use. PIN FEATHER, a short feather. PINHOLE, a very small hole made by a pin; a very small hole. PIN-EYED, a. a term applied by florists to those polyanthuses and auriculas which display a globular stigma at the mouth of the corolla. PIN-MAKER, one who makes pins. PIN-TAIL, a water-fowl. PIN-MONEY, money, by law in England, allowed to a wife, to be paid to her by her husband, for private and personal expenses—formerly expended on pins only when they were very expensive, the name said to be derived from an old tax for supplying the queen with pins. Pin-money never had a legal standing in the United States; and the custom has become obsolete in England. PIN-POINT, the point of a pin; a mere trifle. SAFETY-PINS, double pins whose sharp points are protected from injuring, and are not liable to fall out. SCARF-PIN, an ornamental pin for fixing in a scarf. KNITTING-PINS, long pins of wood, bone, or metal having knobs at one end, used in knitting. WEAK ON HIS PINS, *vulgarly*, feeble in his legs or limbs. IN or TO THE PIN, the liquor tankards were marked with *pins* or legs to indicate measures or quantities—used in reference to drinking or carousing.

PIN, n. *pĭn:* a term applied to a petition or address by foreigners to the emperor of China, or to one of his high dignitaries.

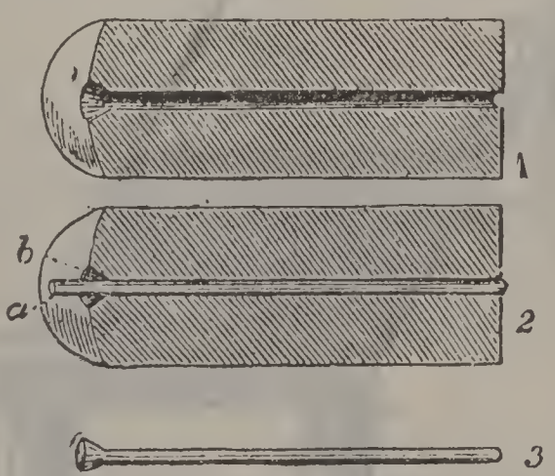
PIN.

PIN: short wire with a point and a head, used as a fastening for dress, etc. As a requisite of the toilet, etc., pins were used in Britain first in the latter part of the 15th c.; they were then made of iron wire, but in 1540 brass ones were imported from France by Catharine Howard, Queen of Henry VIII. Several inventions, however, were previously in use for holding together parts of the dress, such as buckles, brooches, laces, clasps, hooks, etc. At first pins were made by filing a point to a proper length of wire, and then twisting a piece of fine wire around the other extremity, or fixing it after twisting, in order to form a knob or head; and ultimately these operations were so skilfully conducted, that a completely round head was made of very small size, and scarcely showing the nature of its construction. Some pins are still made in this way.

Manufacture.—The old hand processes involved the following operations: 1. *Straightening and Cutting the Wire.*—It is drawn through an arrangement of upright iron rods which straighten it, after which it is cut into lengths of 30 ft., and these again to lengths of four pins. 2. *Pointing.*—This is done by two operations and different workmen, each standing at a separate grindstone; both ends are pointed. 3. *Cutting.*—The length of a single pin is cut off each end; the intermediate portions are pointed at each end, and cut in two. 4. *Twisting the Heads.*—These are made of very thin wire, which is coiled twice, by means of a lathe, around the end of a wire mandrel. 5. *Cutting the Heads.*—The head being formed on the thin wire mandrel, is cut off; as many as 12,000 heads have been made in an hour. 6. *Annealing the Heads.*—They are softened by putting several thousands into an iron ladle, and, after making them red hot, plunging them into cold water. 7. *Stamping or Shaping the Heads.*—This is pressing the heads into shape, at the same time fixing them on the pins by a small hand-press; a good worker will do as many as 12,000 to 15,000 per day. 8. *Yellowing or Cleaning the Pins.*—They are boiled for about half an hour in the dregs of sour beer, or a solution of argol or cream of tartar, and then washed in clean water. 9. *Whitening or Tinning.*—In a large copper pan is first placed a layer of about 6 lbs. of the cleaned or yellowed pins, and over these a layer of grain-tin to the amount of about 8 lbs. Several alternate layers of pins and tin are put in one vessel, and then by a pipe arranged inside the copper pan water is gently poured in, and goes through the pipe to the bottom, first rising up through the different layers so gently as not to disturb them. Fire is now applied to the bottom of the pan, and when it is nearly boiling its surface is sprinkled with ¼ lb. cream of tartar, and the whole is slowly boiled half an hour, then poured into a strainer and shaken, to separate the pins from the grain-tin and liquid; by this process a thin deposit of tin is thrown on the pins, which now are white instead of yellow; without the souring this would not take place, it being essential that they should be quite free from any oxidation or soil. 10. *Washing.*—They are

thoroughly washed in pure water. 11. *Drying and Polishing.*—They are put into a large leathern bag with a quantity of bran, and violently shaken forward and backward by two men. 12. *Winnowing.*—The bran is separated by fanning. 13. *Pricking the Papers to receive the Pins.*—This is done by an ingenious machine, through which the papers are passed, and which, at regular intervals, arranged according to the size of the pins, pinches up a fold of the paper, and at the same time pricks the holes to receive the pins, and then places the pins in their places. Formerly this required a separate operation. Thus 14 persons were required to make and put up for sale a pin, and in some manufactories this is still the case; but in all the large establishments machines are now employed, with immense reduction of hand labor.

The first machine was invented 1824 by Lemuel Wellman Wright, b. in N. H.: his U. S. patent is dated 1825, Mar. 12, and is for 'making pins,' he being at the time a resident of Manchester, Eng. This did very little more than make solid heads to the pins, by a process in principle like that used for nail-making—driving a portion of the pin itself into a counter-sunk hole. The action, however, was automatic, and consisted in an arrangement by which the wire was seized in two small grooved cheeks, as in figs. 1. and 2, which represent them separated. Fig. 1 has the groove empty, but in fig. 2 is seen the wire which projects at *a*. When both cheeks are placed face to face, and the



wire is held tightly in the groove with the small portion (*a*) projecting, a small ram or hammer connected with the machine strikes on *a*, and compresses it into the small cup-shaped depression *b*, and thus the head is formed, as in fig. 3. The pointing and dressing of the pins was afterward carried on as described in the processes for hand-made pins. Since Wright's invention many remarkable improvements have been effected in these machines, which have consequently become very complicated in their details, though the principles on which they act are very simple. No description would convey a satisfactory idea of these wonderful pieces of mechanism, which now, without the aid of hands, complete the pin in all respects except coloring and polishing; but a slight account of the leading features will show their mode of working. First, then, a reel of wire as

it comes from the wire-drawer is placed in the rear of the machine, and the end of the wire is seized by a pair of nippers, which pull it over a fixed *straightening board*, and pass it on completely straightened, until it is seized by two cheeks similar to those in figs. 1 and 2, when a cutter descends and cuts it off, leaving the projecting part for the head: on the withdrawal of the cutter, the hammer flies forward, and makes the head as before described; the cheeks open, and the pins drop on to a sloping metal plate finely grooved, down which they slip with the heads upward, until the end which is to be pointed comes in contact with a cylindrical roller with a grinding surface, which soon grinds points upon them by means of two or three ingenious arrangements: the first is, that the grooved surface of the plate by which the pins descend terminates a little above the grinding roller, then a slight depression is given to the sloping plate, also to the roller, so that one end is an inch or two lower than the other; therefore, as the pin descends the groove (*a*, fig. 4), and is thus brought down the inclined plate until it is lies on the smooth part (*b*, fig. 4), where it is highest, and with its end in contact with the grinding roller (*c*) which is revolving, the pin itself is compelled by the friction of the roller to turn round, and gradually descends from the upper to the lower part of the inclined plate (*d*), and then falls off into a box placed to

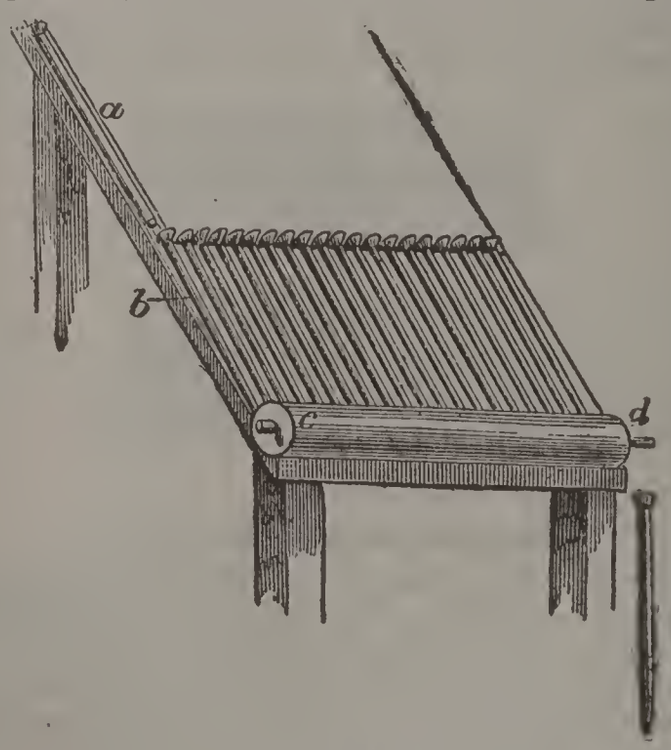


Fig. 4.

receive it. This is attempted to be shown in fig. 4. These operations are performed so rapidly that they can scarcely be followed by the eye, and the pins fall into the box beautifully pointed in a complete stream. They are then *yellowed*, *tinned*, and prepared for papering, which is a remarkable process. The machine by which it is done is worked by two children; one feeds the machine with pins, the other with papers. The first part of the machine is a

box, about 12 inches long by 6 inches broad and 4 inches deep; the bottom is of small square steel bars, sufficiently wide apart to let the shank of the pin fall through but not the head, and they are just as thick as the space between papered pins; the bottom of the box, with the row of pins hanging through it, is seen in fig. 5. The lower part of the bottom of the box at *a* is made to detach itself as soon

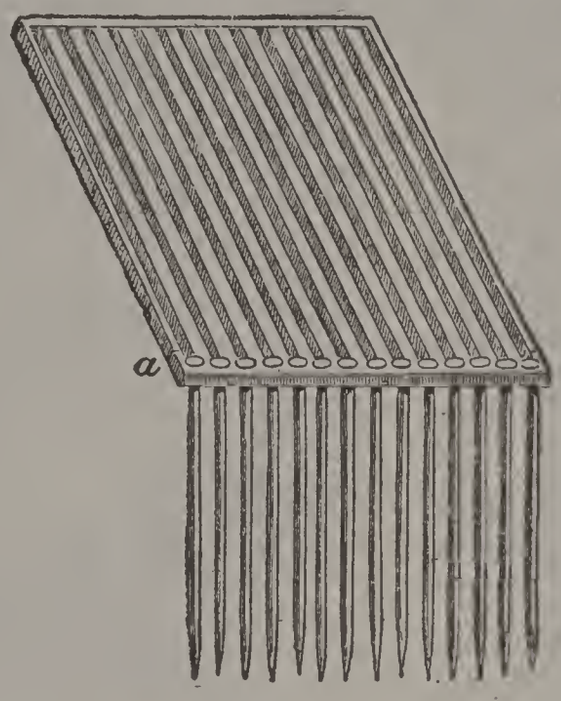


Fig. 5.

as the row of pins is complete, and row after row at regular intervals is received and passed down a corresponding set of grooves, until they reach the paper which, as above described, is pinched into regular folds, and pierced to receive the pins which, by the nicest imaginable adjustments, come exactly to their places, and are pressed into them. Thus many thousand paper packages of pins are put up in one day by two little girls. The Amer. manufacture of pins is chiefly in Connecticut.

PINA CLOTH, *pī'nâ klŏth:* very beautiful fabric of the fibres of the leaves of the pineapple plant (*ananassa sativa*), and allied species. This cloth is made only in Manila, and in its manufacture resembles horse-hair cloth, because the threads both of warp and weft are each single unspun fibres—consequently only small pieces can be made; the workers have, however, a plan of joining the fibres of the coarser kinds end to end, so as to make warp threads of considerable length. Pina cloth is very strong, and the better sorts far excel the finest lawns in texture. It is employed chiefly in manufacture of ladies' pocket handkerchiefs, which often have their costliness increased by beautiful embroidery.

PINACOTHEK, *pĭn-ăk'ō-thĕk* (PINACOTHECA, *pĭn'a-kō-thē'ka*), [Gr. *pinax*, picture; *thēkē*, receptacle]: picture-gallery. The term was applied originally to a room in the left wing of the Propylæa—the grand group of structures that formed the entrance to the Acropolis of Athens, built B.C. 5th c. The room is stated to have been 34 x 26 ft., and to have contained pictures, probably on movable panels, the most of them illustrating, so far as now known, scenes in the Trojan war; also some portraits, including one of Alcibiades. At the time of the visit of Pausanias to Athens, A.D. 170, the pictures were beginning to perish. The Greeks, however, used the name P. for any gallery of pictures, public or private; and the rich Romans adopted the term for a hall in their palaces—usually at the end of the atrium, near a hall of archives—containing statues or any objects of art, as well as paintings, e.g., in the house of Pansa at Pompeii. No modern galleries bear the name except at Munich, where the Old Pinacothek was built 1826–36, adorned externally with frescos by Cornelius and 24 statues of eminent painters; it contains a collection of the old masters, chiefly early German and Flemish, with many examples of Rubens; also 300,000 engravings, 10,000 drawings, and many vases. The New Pinacothek, on a square opposite to the old, is appropriated to painters of the 19th c., and has an important collection of Rottmann's Greek landscapes. The frescos, by Kaulbach, are becoming injured by time.

PINAFORE, n. *pĭn'ă-fōr* [an abbrevation of *pinned before*]: a loose covering of cotton or linen worn in the front or around the dress of children.

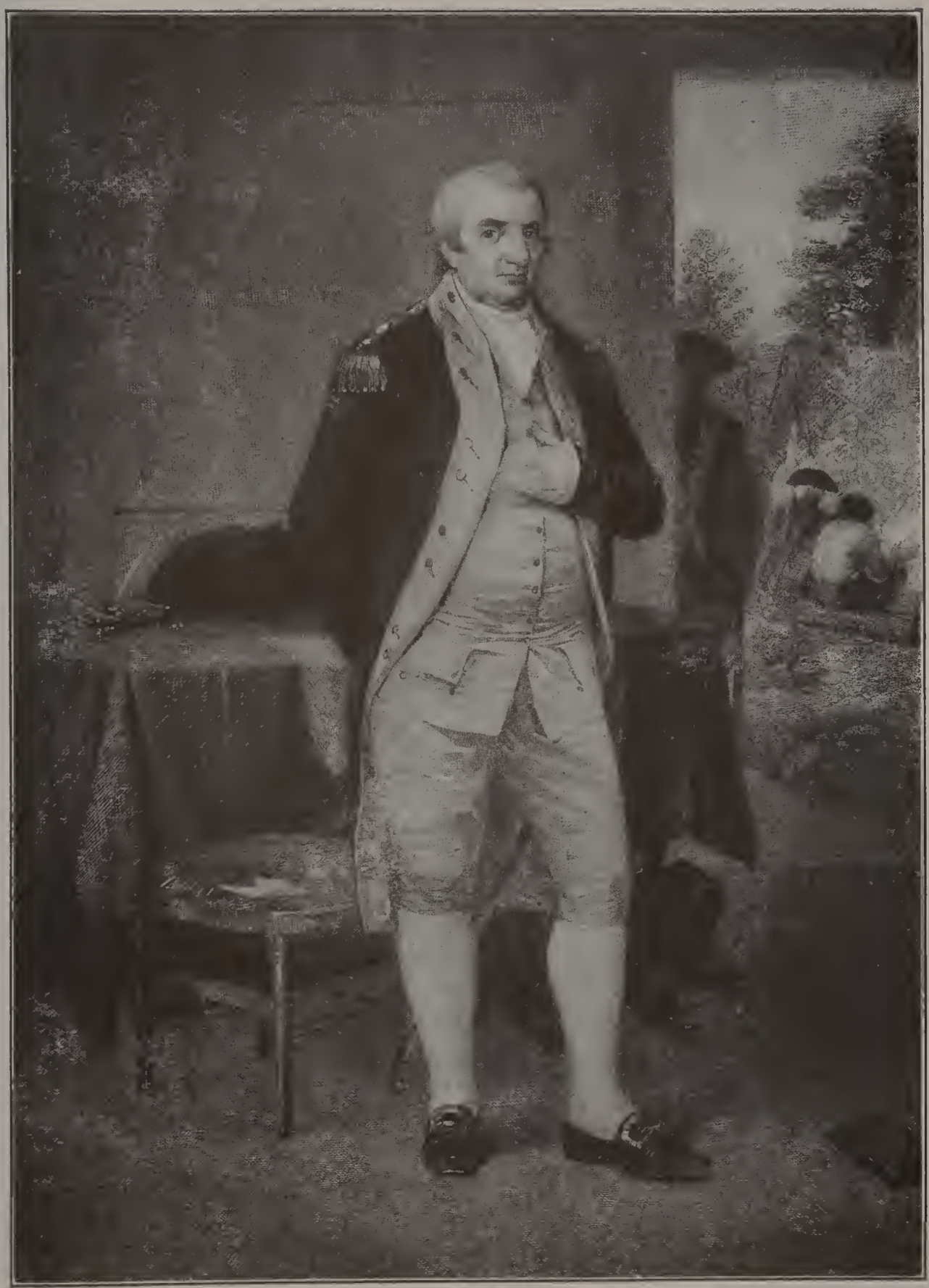
PINAKENCHYMA, n. *pĭn'ăk-ĕng'kĭ-mă* [Gr. *pinax* or *pinăka*, a table; *eng'chuma*, an infusion]: in *bot.*, the muriform tissue of the medullary rays of woody stems, whose flattened, much shortened cells assume a tabular form.

PIN AND WEB [It. *panno nell' occhio*, cloth in the eye: the It. expression was first adopted and then translated]: an induration of the membranes of the eye not unlike a cataract.

PINANG, n. *pĭ-năng'* [Malay]: the betel-nut, *Areca catechu*.

PINASTER, n. *pī-năs'tĕr* [L. *pinaster*, a wild pine—from *pīnus*, a pine]: the cluster-pine of s. Europe; the *Pinus pinas'ter*, ord. *Conif'ĕræ* (see PINE).

PINCERS, or PINCHERS, n. plu. *pĭn'sĕrz* or *pĭn'sherz* [F. *pincer;* Sp. *pizcar*, to pinch: F. *pince*, the tip or edge of the hoof, nippers: Sp. *pinchar*, to prick; *pinzas*, nippers]: an instrument consisting of two parts moving on a pin, for gripping, squeezing, or holding fast; an instrument for drawing out, as nails; the claws of certain animals, as of a beetle or crab. PINCH, n. *pĭnsh*, a sharp and painful gripe by the ends of the fingers or by pincers, etc.; the mark or pain occasioned by it; the small quantity that can be held between the thumb and forefinger; pressure; oppression; distress through want. V. to gripe or squeeze between the thumb and a finger; to squeeze or press between



CHARLES COTESWORTH PINCKNEY.

any two sharp edges or points so as to pain; to distress; to press hard or bear hard upon, as want; to act with a force to be felt; to spare; to be frugal. PINCH'ING, imp.: ADJ. acting as a pincer; nipping; causing pain or distress: n. the act of pinching, squeezing, or pressing. PINCHED, pp. *pĭnsht*. PINCH'ER, n. *-ẽr*, one who or that which pinches. PINCH'INGLY, ad. *-ĭng-lĭ*.—SYN. of 'pinch, v.': to squeeze; nip; press; compress; gall; fret; gripe; oppress; straiten; pain; force; be frugal;—of 'pinch, n.': grip; pain; distress; oppression; difficulty; pressure.

PINCH'BACK, PINCKNEY BENTON STEWART: American lawyer and politician: b. Macon, Ga., 1837, May 10. He was of negro stock, studied in the public schools of Cincinnati, became a river boatman, and in 1862 enlisted in the Union army. In 1867 he was made inspector of customs at New Orleans. He took a prominent part in politics as a Republican leader; was a delegate to the Reconstruction Convention of the State in 1867; was State senator 1868–71, lieutenant-governor 1871–2, and acting governor during Warmoth's impeachment Dec.–Jan. 1872–3. He was elected to the U. S. Senate in 1873, but was never seated though he received regular pay and mileage; in 1882 was named surveyor of customs of New Orleans; and in 1886 was admitted to the bar, but has now retired from practice.

PINCHBECK, n. *pĭnsh'bĕk* [after the inventor, Mr. Christopher Pinchbeck]: gold-colored variety of brass, an alloy of copper or of brass with zinc—3 parts zinc to 16 of copper. Pinchbeck, when new, has a color resembling red gold. It is now seldom used.

PINCKNEY, *pĭngk'nĭ*, CHARLES, LL.D.: statesman: 1758–1824, Oct. 29; b. Charleston, S. C. Educated for the law, he was elected to the legislature while under age. After the taking of Charleston, he was a prisoner till the close of the war. He was member of congress 1785; of the convention of 1787, and author of some clauses of the U. S. constitution; governor of South Carolina 1789, 91, 96, 1806; U. S. senator 1798, minister to Spain 1802–3, when he obtained release of all Spanish claims to territory added to the United States by purchase from France and member of cong. 1819–21, when he was an opponent of the Missouri Compromise.

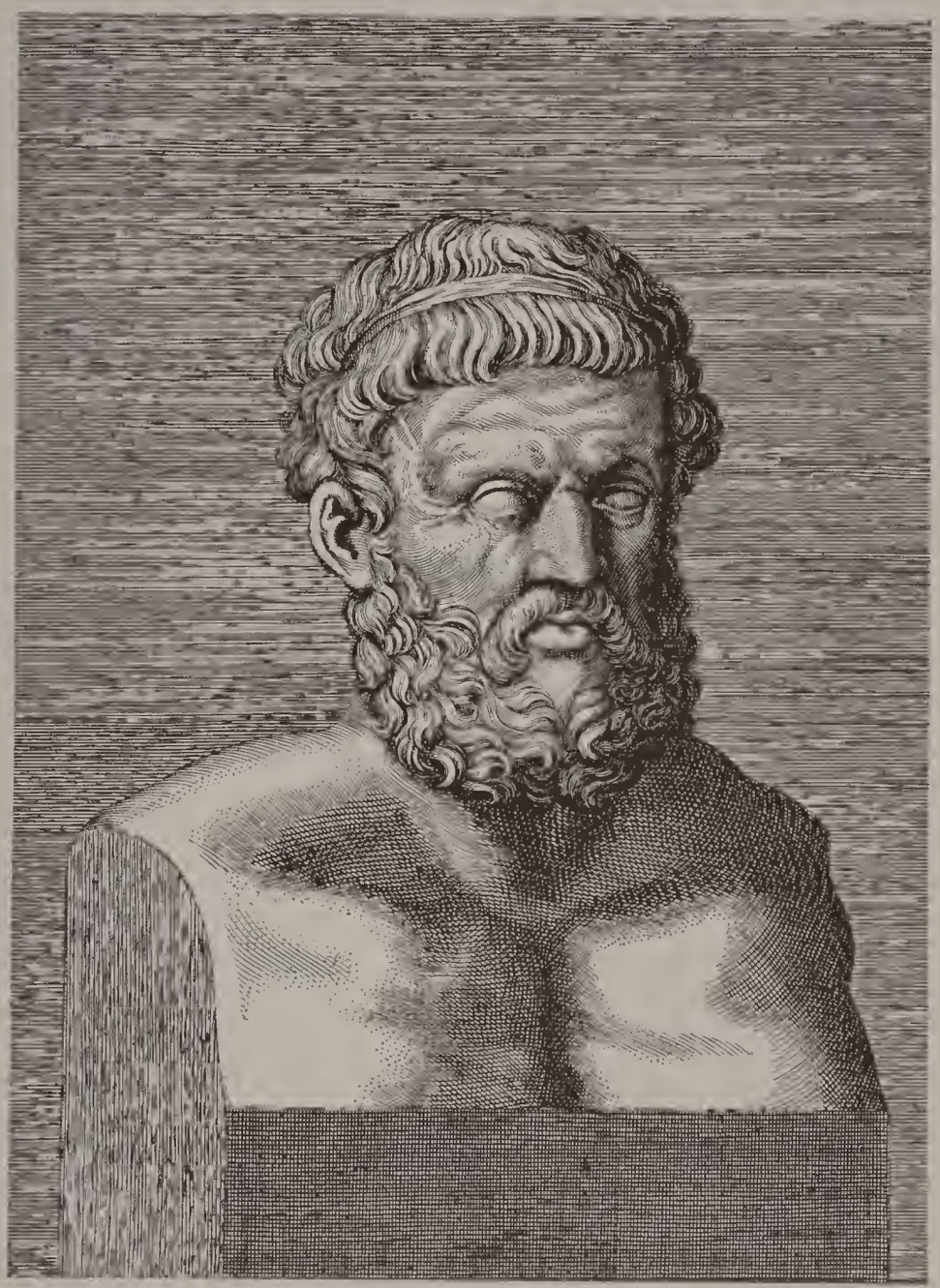
PINCK'NEY, CHARLES COTESWORTH, LL.D.: statesman and soldier in the revolution: 1746, Feb. 25—1825, Aug. 16; b. Charleson, S. C.; son of Charles P., chief-justice of S. C. He was educated at the Westminster School, and Oxford, England; studied law in London, was in the military acad. at Caen, France; returned to Charleston 1769; became atty-gen. of the province; and was mem. of the provincial congress 1775. Appointed capt., then maj., he was engaged in defending Fort Sullivan; promoted to col., he served on the staff of Gen. Washington in the battles of Brandywine and Germantown; took part in the Florida expedition; participated in the attempt

to recapture Savannah 1778, and in defending Charleston against two Brit. attacks, becoming prisoner of war for two years, from 1780, when the city surrendered. In 1782 he was promoted brig.gen. When peace was restored, he resumed the law with much success; was one of the framers of the U. S. constitution, and author of the 'no religious test' clause, and advocated gratuitous service of senators as men of property. Declining several high judicial and administrative offices, he accepted the ministry to France 1796, but was not accepted by the French directory, who threatened war, and to whose suggestion that peace might be purchased, he made the answer that became a proverb—'Millions for defense, but not a cent for tribute.' In anticipation of war, he was appointed maj.gen. by Washington. In 1800 he was federalist nominee for vice-pres., and 1804 and 08 for pres. Among his other dignities, was the first presidency of the trustees of the S. C. Coll., and the same office in the Charleston Bible Soc. He was able, brave, uncompromising, as proved on many critical occasions. He d. in Charleston.

PINCK'NEY, Thomas: statesman and revolutionary soldier: 1750, Oct. 23—1828, Nov. 2; b. Charleston, S. C.; the bro. of Charles Cotesworth P., with whom he was educated in the same institutions abroad. He practiced law in Charleston; entered the patriot army 1775; was on the staff of Gen. Lincoln and Count D'Estaing in the assault on Savannah 1778, and on that of Gen. Gates in the battle of Camden, where he was made prisoner. In 1789 he was elected gov. of S. C.; in 1792 was sent as minister to Spain, and secured the free navigation of the Mississippi river; was mem. of congress 1799–1801. As maj.gen. in the war of 1812, he was in some active service in the south. After his revirement, he interested himself in promoting agriculture and other industries.

PINCKNEYA, *pĭngk'nĭ-a,* or Geor'gia Bark (*Pinckneya pubens*): beautiful shrub, with clusters of purplish spotted flowers, tubular, 1 in. long, and a lobe of the calyx developed into a large rose-colored leaf. It is found in wet places from S. C. to Fla., and belongs to the Madder family (*Rubiaceæ*), which contains plants so very dissimilar in appearance as the Bedstraws, Button-weeds, Partridge-berry, our pretty Houstonia, the Coffee and Peruvain Bark trees, to the tonic value of which last the P. has some resemblance in the properties of its bark; whence the name Georgia Bark.

PINCZOVIAN, or Pinkzovian, n. *pĭngk-zō'vĭ-an* [from *Pinczow* in Poland]: name given in the 16th c. to the leaders of the Polish Antitrinitarians, for the most part originally, only Arians; they separated from the Protestant Church at a synod 1563.



PINDAR.

PINDAR, *pĭn'dẽr* (Gr. *Pindaros*): great lyric poet of Greece: about B.C. 522—prob. B.C. 442; b. at Cynoscephalæ, a village in the territory of Thebes; of noble family. His genius for music was hereditary, and at an early age he was sent by his father, himself a flute-player, to receive instruction in the same art from Scopelinus. At this time his genius for poetry too—foreshadowed, according to later writers, by a swarm of bees miraculously resting on his lips in his sleep—began to develop; and he went to Athens to be placed under the tuition of Lasus of Hermione, founder of the Athenian school of dithyrambic poetry. Before completing his 20th year he returned to Thebes, where he continued his studies under Myrtis and Corinna, of Tanagra, two poetesses then famous in Bœotia. With both his instructresses he contested the prize for music at Thebes, but was five times defeated by Corinna. He was still young when he entered on his professional career as a poet, and his services soon were in great request on festive occasions throughout the Hellenic states. He composed choral songs for Hiero, tyrant of Syracuse; Alexander, son of Amyntas, King of Macedonia; Theron, tyrant of Agrigentum; Arcesilaus, King of Cyrene; also for many free states and private individuals. He won not only admiration for his lyrical genius, but also respect for his independent character, which, amid all the presents and rewards conferred upon him, never degenerated into that of the poet who merely performed for hire. He was the favorite especially of Alexander, King of Macedonia, and of Hiero, tyrant of Syracuse; and it is said that to the praises he lavished on the former of these monarchs, his house owed its preservation at the hands of Alexander the Great, when he reduced the rest of Thebes to ruins. His life mostly was passed abroad at the courts of kings, and at the scenes of the great public games; and at one period, about B.C. 473, he resided at Syracuse at the court of Hiero for four years. Of the immense number of his poems, consisting of hymns to the gods, pæans, dithyrambs, odes for processions (*prosodia*), maidens' songs (*partheneia*), mimic dancing songs (*hyporchemata*), convivial songs (*scolia*), dirges (*threnoi*), and encomia on princes, we possess only fragments. His *Epinikia*, or Triumphal Odes, however, have come down to us entire; and from these—divided into four books, and celebrating the victories won in the Olympian, Pythian, Nemean, and Isthmian games respectively—we must form our opinion of P. as a poet. A victory at these games conferred honor not on the winner and his family only, but also on the city to which he belonged; and for its celebration—which began with a procession to the temple, where sacrifice was offered, and ended with a convivial banquet—a poem was specially composed, and was sung by a chorus either during the procession, or, more frequently, at the banquet (*comus*). P.'s poetical style is peculiar. Full of bold conceptions and striking metaphors, his manner is so rapid and so subject to abrupt transitions, as to render him not only a difficult but also an obscure composer. Typical

examples of his strength, as well as of his weakness, are in the Second Olympian and First Pythian Odes, in which the description of the Islands of the Blest in the former, and of an eruption of Mount Etna in the latter, are brilliant offsets to the shadowy mythological allusion and the undeveloped metaphor which also characterize them. His metres, in spite of the able efforts of Böckh, still remain to be satisfactorily elucidated; and all that we can here say to them is, that he makes chief use of the Dorian rhythm, and frequently of the Æolian and Lydian. He has been fortunate neither in his numerous imitators nor translators—Gray being, perhaps, most successful among the former, and West, Abraham Moore, Cary (1833), Paley (1869), and E. Myers (1875), among the latter. He has been explained in Schmidt's *Pindar's Leben und Dichtung* (1852); in Villemain's brilliant *Essais sur le Génie de Pindare* (1859); and in works by J. T. Mommsen and Mezger (1880). The best editions are those of Böckh; of Dissen, re-edited by Schneidewin; Bergk (in *Poetæ Lyrici*), and J. Tycho Mommsen (1864).

PIN'DAR, Peter: see Wolcot, Dr. John.

PINDAR, or Pinder, n. *pĭn'dẽr*, or Pinner, n. *pĭn'nẽr* [AS. *pyndan*, to pen up; *pund*, a pound for cattle]: in *OE.*, one who impounds stray cattle.

PINDARIC, a. *pĭn-dăr'ĭk:* after the style of the Greek lyric poet *Pindar*, or in imitation of him; irregular.

PIND DADUN KHAN, *pĭnd dâ-dŭn' ċhân:* town in the Punjab; on a narrow verdant plain on the right bank of the Jhelum, and at the s. base of the Salt Range or Kalabagh Mountains, 110 m. n.w. of Lahore. The town consists of three groups of houses, four m. from the Jhelum. The houses are of mud, but the framework is of cedar-wood. In the vicinity, salt is extensively raised in the Salt Range see Punjab. Total pop. 13,340.

PINDUS, *pĭn'dŭs:* ancient name of a chain of mountains in Greece (q.v.).

PINE, n. *pīn* [F. *pin;* It. or Sp. *pino;* AS. *pín;* L. *pīnus;* Dut. *pijn*, the pine-tree]: coniferous timber-tree of several species characterized by its pin or needle shaped leaves; the *Pinus sylves tris*, the Scotch fir; *P. strŏbus*, the white pine; *P. marit'ima*, the Bordeaux pine; *P. palus'tris*, the swamp pine (see below). PINY, a. *pīn'ĭ*, abounding with pine-trees. PINEAL, a. *pī'nē-ăl* or *pĭn' ē-ăl* [L. *pīnĕus*, of the pine, piny]: pertaining to or like the fruit of a pine-tree. PIN'ERY, n. *-ĕr-ĭ*, a hothouse where pineapples are raised. PINEY, a. *pīn'ĭ*, abounding with pines: N. a fat or tallow obtained by boiling the fruit of a tree, *Vatĕrĭă in'dĭca*, common upon the Malabar coast. PINETUM, n. *pīnē'tŭm* [L. *pīnētum*, a pine-wood]: a plantation or wood composed of pine-trees. PINIC, a. *pīn'ĭk*, of or from the pine, applied to an acid obtained from pine-resin. PINE-CLAD, a., or PINE-CROWNED, a. covered with pines. PINE-APPLE, tropical plant (*Ananassa sativa*): also its fruit, of a conical shape—so called from the fruit resembling the cone of the pine-tree (see below). PINE-BARREN, tract of arid land producing pines.

PINE, v. *pīn* [Dut. *pijne*, pain, an ache; *pijnen*, to torture: Ger. *pein*, torture (see PAIN)]: to cause to languish; to droop or waste away under distress or anxiety of mind; to lose flesh or wear away with pain, grief, anguish, desire, and the like: N. in *OE.*, want; suffering of any kind. PIN'ING, imp.: ADJ. wasting away: N. a state of languishing or wasting away. PINED, pp. *pīnd*. PIN'INGLY, ad. *-lĭ*.—SYN. of 'pine, v.': to languish; flag; wither; decay; droop; wear away; waste away.

PINE (*Pinus*): genus of trees of nat. order *Coniferæ*. The Linnæan genus includes all kinds of fir, larch, and cedar; but as now limited, the genus *Pinus* is distinguished by monœcious flowers, and woody cones with numerous two-seeded scales, the scales having an angular truncated apex. The leaves are linear and very narrow, of very dark-green color, growing in clusters or in pairs, and surrounded by scarious scales at the base. To this genus belong many noble and useful trees. They grow mostly in mountainous or other exposed situations, and their narrow leaves are admirably adapted to evade the force of winds, which produce in the tops of pines a peculiar sound, much noticed by the ancient poets, more soft and continuous than in trees of richer foliage. Most of the pines are more or less social, one kind often covering a considerable tract; some of them clothing the sides and even the summits of mountains with magnificent but sombre forests; some growing in lower situations, on otherwise unproductive sandy grounds—e.g., the *Pine Barrens* of N. America. The pines growing in the most barren soils, or in the coldest climates and most exposed situations, are often very small; and though very unlike any other shrubs or bushes, are scarcely to be called trees. Pines are widely diffused over the n. hemisphere, being found on mountains within and near the tropics; and in the colder temperate and the arctic regions descending to the level of the sea.

The SCOTCH P. or SCOTCH FIR (*P. sylvestris*), the only

species indigenous to Britain, has leaves in pairs, about an inch and a half long; the cones about the same length, obtuse, and with unarmed scales. On very poor soils and at great elevations it is reduced to a kind of shrub; but in favorable situations it becomes a lofty tree. A plank five ft. and a half in width has been obtained from a Scottish forest. The Scotch P. is of quick growth, but has been known to attain the age of 400 years. Its head is somewhat conical or rounded, and the lower branches die off as the tree grows, leaving the older trees bare of branches for the greater part of their height; but it is more apt to send off large branches than most of the Coniferæ. Immense forests of it exist in some countries of Europe, in some of which it is mingled with the spruce fir. In central and n. Europe and Asia it is found even in plains near the level of the sea, especially where the soil is somewhat sandy; in s. Europe it grows only on mountains. Its timber is highly valuable, being very resinous and durable, and is the *Red Deal* or *Red Pine* used in house and ship-carpentry. There is very great difference, however, in the timber of Scotch P. growing in different soils and situa-

Braemer Pine.

tions; rich soils and sheltered situations being unfavorable to the quality of the timber, which becomes white, soft, and comparatively worthless; and of the several varieties of Scotch P., some yield timber much superior to others. One of the best varieties is that which forms the northern Scottish forests, often designated *Braemar P.* by nurserymen. It is remarkable for its very horizontal branches,

and is therefore sometimes called *P. horizontalis*.—The Scotch P. is valuable for other products besides its timber. Common Turpentine is obtained from it, and much Tar, Pitch, Resin, and Lamp-black. (See these titles.) Oil of turpentine is sometimes distilled from the cones, and even from the leaves; the leaves also have been used in Germany for manufacture of a substance resembling tow, and called *Waldwolle* (forest wool), suitable for stuffing cushions, etc. The resinous roots are dug out of the ground in many parts of the Highlands of Scotland, and divided into small splinters, which are used instead of candles. Fishermen, in some places, make ropes of the inner bark; which is applied to a very different use, when most soft and succulent in spring, by the Kamtchatdales and Laplanders, being dried, ground, steeped in water to remove the resinous taste, and used for making a coarse kind of bread.—The DWARF P. (*P. Pumilio* or *P. Mughus*) is found on the Alps and Pyrenees, its trunk often lying on the ground, though sometimes it appears as a bush or low tree. The recumbent trunks are called *Krummholz* (crooked-wood) and *Knieholz* (knee-wood) by the Germans.—The leaves are in pairs, very like those of the Scotch P., but a little longer; the cones also are similar. By distillation from the young shoots, an oil resembling oil of turpentine is obtained, which is a kind of universal medicine among the peasantry of Hungary, as is also the resin spontaneously exuding from the tree and known as *Hungarian Balsam*.—The BLACK P., or BLACK FIR (*P. nigricans*, or *P. Austriaca*), is another species closely allied to the Scotch P., but remarkable for its very long leaves: it is a native of Austria. It abounds in resin more than any other European tree.—To the same group of pines belongs the SEASIDE or TAURIAN P. (*P. Pallasiana*, *maritima*, or *Taurica*), which also affords resin in great quantity, and of very pleasant odor. It is found in many parts of s. Europe. Its timber is of little value; but great part of the turpentine of the *Landes* and other maritime districts of France is obtained from it. It yields also part of the *Burgundy Pitch* of the apothecaries' shops.—The ALEPPO P. (*P. Halepensis*), native of s. Europe, Syria, etc., is a very graceful tree of moderate size, with leaves in pairs and slender. It yields a liquid resin or turpentine, sold as *Venice Turpentine*. The wood is extensively used in the Levant for ship-building.—The LARICIO (*P. Laricio*) has leaves in pairs, lax, and 4–8 inches long, cones 2–4 inches long, with the scales slightly pointed: it is often called the CORSICAN PINE. It grows on the shores of the Mediterranean, and is valuable both for its timber and for its resinous products. In the island of Corsica it frequently attains the height of 140 ft. It grows well in sandy soils, and has been made particularly useful for preventing the drifting of the sand, and turning to account the otherwise useless tracts between the mouths of the Garonne and the Adour in France, thus also preserving valuable lands which the sand threatened to overwhelm.—The PINASTER or CLUSTER PINE (*P. Pinaster*) is another of the most

important European species: it has cones in whorls of 3, 4, or even 8 together, 4–6 inches long, leaves in pairs, and very long. It is found on the shores of the Mediterranean, also in the Himalaya and in China. It has been used in France in the same way as the Laricio, for covering waste sandy tracts. The timber is inferior, but great quantities of resin are procured from it. It yields *Bordeaux Turpentine.*—The PYRENEAN P. (*P. Pyrenaica*) is a majestic tree, native of the Pyrenees, and producing very fine timber.—The CALABRIAN P. (*P. Bruttia*) somewhat resembles the Pinaster.—The STONE P. (*P. pinea*), a tree with a broad umbrella-shaped head, a form seen often also in the Scotch fir, forms a characteristic feature of the scenery of the Mediterranean, and is frequently introduced

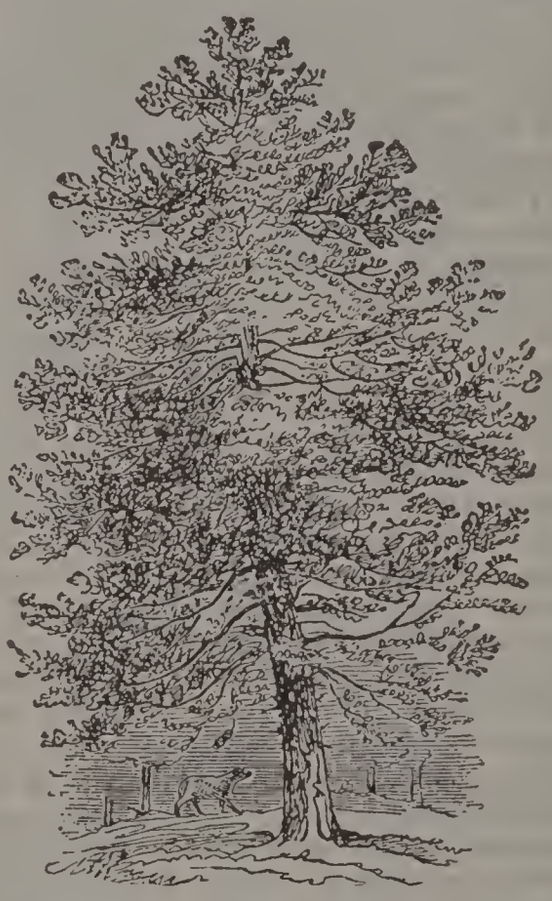
Stone Pine (*P. pinea.*)

in paintings. It is the *Pinie* of the Germans, *Pignon* of the French. The leaves are in pairs, 4–5 inches long; the cones very large, ovate, and obtuse. The seeds, which do not ripen till the fourth year, are large, abound in a fixed oil, and when fresh, have a sweet taste resembling that of almonds. They are used in Italy and other countries in the same way as almonds and pistachio nuts for the dessert, in various dishes, also in emulsions, etc., under the names of *pinies*, *pinioles*, and *pignons*. The use of them, however, is almost confined to the countries in which they are produced, as they very soon become rancid. The wood is very useful and beautiful; it yields resinous products only in small quantity.—The CEMBRA P., or SWISS STONE P., which grows in central parts of Europe and s. Siberia—a stately tree, with the lower branches more persistent than

in most pines, and rigid leaves in groups of three to five—also produces eatable seeds (*Cembra Nuts*), which, although they are extracted with difficulty, are much used. The cuticle contains a resinous juice; but in Siberia this fruit is so much prized that noble trees are often cut down to obtain it. The Cembra P. yields a pellucid, whitish oil, resembling oil of turpentine, and known as *Carpathian Balsam*.

N. America produces many species of P., some of them very beautiful and very valuable. Besides those long known, found in the states and colonies near the Atlantic, a number of the noblest species of this genus have been discovered in California and n.w. America.—The Red Canadian P. (*P. resinosa*) is found from Canada to the Pacific, but not far south in the United States: it is the Yellow P. of Canada and Nova Scotia. It delights in dry and sandy soils, and attains a height of 70–80 ft., with diameter of two ft. at the base, the trunk continuing of uniform diameter for two-thirds of its length. The leaves are in pairs, and are congregated toward the extremities of the branches. The timber is highly esteemed for strength and durability, and furnishes excellent planks for ship-building: it is used also for masts.—Somewhat resembling this in botanical characters is the Northern Scrub P., or Gray P. (*P. Banksiana*), generally only 3–10 ft. high, which begins to appear in the n. parts of the United States upon high mountains, and is interesting as an arctic species, extending further n. than any other.—The Yellow P. (*P. variabilis*, or *P. mitis*) abounds in the Atlantic states from N. J. to Va. It is a tree 50–60 ft. high, 15–18 inches in diameter at the base, with leaves 4–5 inches long, usually in pairs, but sometimes in threes upon the younger shoots. The timber is extensively used for ship-building, and is largely exported to Great Britain: at Liverpool it is known as New York Pine.—The Jersey P., or Scrub P. (*P. inops*), abounds in the lower parts of N. J., and thence to the southwest. The leaves are in pairs, 1–2 inches long, the cones armed with strong spines. The tree is rarely 30 or 40 ft. high. Great quantities of tar are made from it in Ky.—The Pitch P. (*P. rigida*) is native of the n. and middle parts of the United States, growing often in great miry swamps, and attaining a height of 70–80 ft., and a diameter of two ft. at the base. The leaves are in threes, varying much in length, as the cones do in size. Immense quantities of it are used for fuel. Tar and lamp-black are sometimes made from it. The Loblolly or Old Field P. (*P. Tæda*) grows in dry and sandy soils in lower parts of the southern states, often occupying lands exhausted by cultivation. Vast tracts never cultivated, in the southern states, are *Pine Barrens*, in great part covered with this species. It attains a height of 80 ft. and upward, and has a widespreading crown. The leaves are 6 inches long, in threes, sometimes in fours on young branches; the cones 4 inches high, with strong spines. The timber is not of much value.—The Long-leaved P., or Southern P. (*P. palustris*, or *P. Australis*), is perhaps the most important

N. American forest-tree. It furnishes the greater part of the tar, resin, pitch, and turpentine used in the United States. The timber also is very valuable, and is much used for ship-building. It is called often GEORGIA PITCH PINE. The tree attains a height of 6–70 ft., and a diameter of about 16–18 inches; the leaves are in threes, and about 12 inches long; the cones 7–8 inches long, and 4 inches in diameter, with small spines. The seeds are sometimes eaten.—The WHITE P. (*P. strobus*), called by the English the WEYMOUTH P., attains a height of 150 ft., and a diameter of 5 ft. and more. It has lax sub-triangular leaves in groups of five; and pendulous cones 4–5 inches long, with thin smooth scales. It is frequently planted in Britain and on the continent of Europe for its beauty. In its native country it abounds chiefly from lat. 47° to lat. 43°, and southward on the Alleghanies. The timber is not strong, but easily wrought and durable.—Another e. species is the TABLE MT. P. (*P. pungens*) of the s. Alleghanies.—Of



Lambert's Pine (*P. Lambertiana*).

the species belonging to n. w. America, one of the most magnificent is *P. Lambertiana*, found on the Rocky Mountains, between lat. 40° and lat. 43°, chiefly in sandy soils. It attains a height of 150–200 ft., and a diameter of 7 ft. and more, almost to 20 ft. The trunk is remarkably straight, and destitute of branches for two-thirds of its height; the leaves in fives, the cones more than 12 inches long. The timber is white, soft, and light; and the tree produces great quantities of a pure amber-colored resin, which, when the wood is partly burned, is changed into a somewhat saccharine substance, used by the natives as a sub-

stitute for sugar. The seeds are eaten either roasted or pounded into coarse cakes.—*P. flexilis* is found on the Rocky Mountains, near the head-waters of the Arkansas, and occurs almost to the limit of perpetual snow. It has a dense crown, formed of numerous and remarkably flexile branches. The leaves are in fives. The seeds are used as food by hunters and Indians.—*P. ponderosa*, another native of the Rocky Mountains, is a magnificent tree, remarkable for the heaviness of its timber, which almost sinks in water. The leaves are in threes, and 9–14 inches long.—*P. Sabiniana*, *P. Coulteri*, and *P. insignis*, also are noble species from the w. of N. America.

The Himalaya Mountains abound in pines, some of which rival in magnificence those of n. w. America. The Bhotan P. (*P. excelsa*), much resembling the white P. in its botanical characters, and attaining a height of 90–120 ft., abounds in Bhotan, though it is not found in the neighboring countries of Sikkim and Nepaul. The wood is highly valuable, being durable, close-grained, and so resinous as to be used for flambeaux and candles.—The Cheer P. (*P. longifolia*) of India is a tree of remarkable and most graceful appearance; with leaves in threes, very long, very slender, and generally pendulous. It is abundant on the crests of hills in the lower Himalaya, growing at a lower elevation than the other pines. It is cultivated in parts of India as an ornamental tree. It is much valued for its resin. The wood is used in India as a substitute for European deal.—The Khasia P. (*P. Khasiana*) is peculiar to the Khasia Mountains, and has much the general appearance of the Scotch pine.—*P. Gerardiana*, a species with leaves in threes, is a large tree, native of Nepaul. The seeds are eatable.—The mountains of India and of n.w. America produce numerous other species; Mexico has a number of very fine species peculiar to itself; the mountains of St. Domingo have one; the Canary Islands have one; China and Japan also have some. The name P. is often popularly extended, and even in scientific works, to other *Coniferæ*.

Pine-timber.—This term is in general use for the timber of the pine-tribe (see Coniferæ), and is not confined to that of the genus Pinus, but embraces the wood of species of Abies, Larix, Araucaria, Dammara, etc. Red and white pine is yielded by the Scotch Fir (*Pinus sylvestris*), and deal timber by the Spruce Fir (*Abies excelsa*). These two, with the Larch (*Larix Europæa*), yield the greatest part of the pine-timber of Europe. Next in importance is the pine-timber of the British N. Amer. colonies, which is yielded chiefly by the Weymouth or White Pine (*Pinus strobus*); though, doubtless, the wood of other coniferous trees is often substituted for it. It makes excellent masts; but is not so serviceable for large timbers, as it is subject to dry-rot. The wood has a peculiar odor. Red pine is found from Canada to Pennsylvania; it is intermediate for durability between white pine and pitch pine. (For *Redwood*, see Puget Sound.) In 1881 Canada exported to Great Britain timber to the value of £3,876,645. The celebrated pitch

pine of Savannah is the product of *Pinus rigida:* it is used for ships' masts and yards, and for purposes requiring great strength and durability, in both of which qualities it excels most others of its kind. The kinds above mentioned are those which constitute the greater part of the pine-timber used in ship and house-building, carpentry, etc., in Great Britain. In France, the timber of the Corsican Pine (*Pinus Laricio*) and the Seaside Pine (*Pinus pinaster*) are greatly used. In Italy the pine-timber is yielded chiefly by the Stone Pine (*P. pinea*) and the Calabrian Pine (*P. Bruttia*); that of Spain is from the Pyrenean Pine (*P. Pyrenaica*). In Germany, and especially in Austria, the Black Pine (*P. Austriaca*) furnishes the greater portion; but the fine-grained, soft white pine, or deal, so much used for sounding-boards of musical instruments, is the wood of the Silver Fir: see FIR. The trade in this timber is very great. The finest is cut in the forests of Bohemia, where large establishments are formed for dressing and preparing the wood for various purposes.

The timber of the Norfolk Island P. (*Araucaria excelsa*) is sometimes exported for ships' masts. The chief value of this class of timber-woods is in the combination of lightness and strength with softness of texture and ease in working with ordinary tools; they are used more than all other kinds of wood together. Much confusion prevails as to their common designations; *fir*, *pine* (and in Britain *deal*) are terms applied to all and each of them, according to the caprice of the individual. The first two names are used because the material is derived from one or other of those genera: but the last is a misnomer altogether, as the term deal belongs only to pieces of fir or pine timber cut to particular sizes: they are three inches in thickness, nine inches broad, and of variable length; if of less width, they are called *battens*.

PINEAL GLAND, or PINEAL BODY, n. *pī′nē-ăl* or *pĭn′ē-ăl* [L. *pīnus*, a pine; *pīnĕus*, of or belonging to a pine]: in the *brain*, small reddish-gray body, of conical form, named from its resemblance to the fruit of the pine. It rests upon the corpora quadrigemina of the brain, in front of the cerebellum. It is about four lines in length, and two to three in width at its base—about the size of a small pea. It is larger in the child than in the adult, and in the female than in the male. It consists chiefly of gray matter, and in its base is a small cavity, which contains a transparent, viscid fluid, in which are granules chiefly of phosphate and carbonate of lime, and termed *acervulus cerebri*. This organ was regarded by some ancient philosophers, also by Descartes, as the seat of the soul.

PINE′APPLE, or ANANAS. *ăn-ā′năs* (*Ananassa sativa*): plant of nat. order *Bromeliaceæ*, highly esteemed, and much cultivated for its fruit. The fruit is a *sorosis*, formed by the calyces and bracts of a close spike of flowers, becoming succulent and combined: this is the distinctive character of the genus *Ananassa*. The P. has a number of long, serrated, sharp-pointed, rigid leaves, springing from the root, in the midst of which a short flower-stem is

PINEAPPLE.

thrown up, bearing a single spike of flowers, therefore a single fruit. From the summit of the fruit springs a crown or tuft of small leaves, capable of becoming a new plant, and much used by gardeners for planting; the P., in cultivation, being propagated entirely by crowns and suckers, as, in a state of high cultivation, perfect seed is almost never produced. The P. is a native of tropical America; it is found wild in sandy maritime districts in the n.e. of S. America, but it has been much changed by cultivation. It has also been gradually diffused over tropical and sub-tropical countries, and not only as a cultivated plant, for it is fully naturalized in many parts of Asia and Africa. It delights in a moist climate, and consequently does not thrive in the dry climate of s. Italy, though the warmth is sufficient. The first particular account of the P. was given by Oviedo 1535. It was cultivated in hot-houses first in Holland; but it was introduced into England in the end of the 17th c., and its cultivation rapidly became general in the gardens of the wealthy. Since the peace of 1815 it has received similar attention in continental Europe. Great care is requisite in its cultivation; otherwise it is generally fibrous and coarse, with little sweetness or flavor; but with careful culture, one of the most delicate and richly flavored of fruits. Its size also depends very much on cultivation. The weight varies from 2½ to 12 lbs.

In the cultivation of the P. in northern countries, a tropical heat must always be maintained. The cultivation is generally in hothouses especially appropriated to it, called *Pineries* or *Pine-stoves;* sometimes also in flued pits; sometimes even without fire-heat, in frames continually supplied with fresh tanners' bark and dung. The universal practice formerly was to grow the plants in pots, plunged to the requisite depth in tanners' bark or other fermenting matter; and these were transferred from one house or one compartment to another, according to their stage of advancement, three years' culture being deemed requisite from the planting of a crown or sucker to the production of the ripe fruit; but the P. is now often planted in beds, and fruit of the best quality is sometimes obtained in fifteen months. The best soil is a rich and rather sandy loam, formed often from the turf of old pastures, with dung, peat, sand, etc., thoroughly mixed. Ventilation must be freely allowed from time to time, but care must be taken to keep the atmosphere moist. A P. which has borne fruit is thrown away as useless.

There are many varieties in cultivation, differing in the more or less spiny serratures of the leaves, the globular, cylindrical, or pyramidal fruit, its size, etc. A spirituous liquor (*Pineapple Rum*) is made from the P. in some warm countries.—For the use of the fibre of the P., see BROMELIACEÆ.

PINE BLUFF: city, cap. of Jefferson co., Ark.; on Arkansas river, and on the Pine Bluff and Eastern, the St. Louis Iron Mountain and Southern, and the St. Louis and

Southwestern R.R's.;46 m. s.s.e. of Little Rock. It is in an agricultural region in which cotton is one of the chief products. Its chief manufacturing establishments are cotton gins, cotton compresses, cottonseed-oil mills, foundry, furniture factory, feed mills, printing establishments, and boiler-sheet iron works. The railroad shops of the Saint Louis Southwestern are located there. The annual fair under the auspices of the State Fair Association is held here. It is the seat of the State Colored Normal College, the Merrill Institute, and a girls' industrial school, and it has public and parish schools, and a public library. There is a free library connected with the Merrill Institute. Pop. (1900) 11,496; (1910) 15,102.

PINE'-CHAFER, or PINE'-BEETLE (*Hylurgus piniperda*): small coleopterous insect of family *Xylophagi:* see BARK BEETLE. It is often very destructive to Scotch firs in rich soils and low situations, attacking the young terminal shoot in summer, and soon eating its way into the heart, which it proceeds to excavate, converting the shoot into a tube. Pines in open situations are little liable to the attacks of this insect; and trees 30 ft. in height, or upward, are very rarely attacked. The insect is about the size of a seed of the Scotch fir, and of black or dark-brown color.

PINE'-FINCH, or PINE'-GROSBEAK (*Pinicola*): genus of birds of family *Fringillidæ*, nearly allied to bullfinches and crossbills, the bill nearly resembling that of the former, but the tongue very similar to the tongue of the crossbills, with the same peculiar bone articulated to the hyoid bone: see CROSSBILL. One species,, the COMMON PINE-FINCH (*P. enucleator*), is abundant in many n. parts of Europe, Asia, and America. It is larger than a bullfinch, but much resembles the bullfinch in form, wings, tail, etc. The general color of the male is red. This bird frequents pine-forests, and associates in flocks in winter. It is easily tamed. Its song is rich and full.—There are other species in northern regions.—The name of Pine-finch is given in N. America to a very different and much smaller bird (*Chrysomitris pinus*), the Pine-finch Linnet or American Siskin.

PINEL, *pe-nĕl'*, PHILIPPE: French physician: 1745, Apr. 20—1826, Oct. 26; b. Saint-André, dept. of Tarn. After a good classical education at the College of Lavaur, he removed to Toulouse, where he studied medicine, and took his degree 1773. He continued his medical studies at Montpellier, maintaining himself meantime by teaching mathematics; and 1778 removed to Paris, where he acquired some reputation by a translation into French of Cullen's *Nosology* (1785), and by Memoirs on zoology and comparative anatomy. Having applied himself with success to the study of mental alienation, he became chief physician of the Bicêtre (insane asylum) 1793; and 1795 was chosen to the same

office at the Saltpêtrière (similar asylum, for females). In the latter institution Pinel commenced a class of clinical medicine, which he continued after his appointment to the chair of medical physics and hygiene, and subsequently that of pathology, at the School of Medicine in Paris. He was admitted as a member of the Institute 1803. He died at Paris. His most valuable works were his *Traité Medico-philosophique de l'Alienation Mentale* (1791), and *La Nosographie Philosophique* (1798), with its commentary, *La Médecine Clinique* (1802).

PINENCHYMA, n. *pī-nĕng'kĭ-mă* [Gr. *pinax*, a tablet; *eng'chuma*, an infusion, substance of organs—from *eng'cheō*, I infuse]: in *bot.*, a cellular tissue of plants arranged in a tabular form: other spelling, PINAKENCHYMA.

PINERO, *pĭ-nĕr'ō*, ARTHUR WING: English dramatist: b. London 1855, May 24. His ancestors, the Pinheiros Portuguese Jews, settled in England in the 18th century. He was a solicitor's clerk for several years; went on the stage in 1874, appearing first in Edinburgh; became a member of Henry Irving's company soon afterward, playing Claudius in *Hamlet;* and had written a farce, *Two Can Play at That Game;* a successful comedietta, £200 *a Year;* the one act plays, *Daisy's Escape* and *Bygones*, which were curtain-raisers for the Irving company at the Lyceum; and in 1881 *The Squire* and *Imprudence*, before turning himself in 1882 entirely to dramatic authorship. His earliest plays after that date show a striving after real characters—none too successful, for example, in *The Magistrate* (1885). The beginning of his naturalistic power was to be seen not only in the well-known farces of the next two years, *The Schoolmistress*, *The Hobby-horse* (1886), and *Dandy Dick* (1887), but in the tragedy called *The Weaker Sex*, first played in 1888. *Sweet Lavender*, a pretty, rather unpleasant, very unreal and quite uncharacteristic play, was written in 1888. *The Profligate*, with its Puritan theme of the impossibility of burying a wicked past, was dramatically powerful but poorly written. It was followed by the weak farces, *The Cabinet Minister* and *The Times*, in 1891 by *Lady Bountiful*, and in 1893 by *The Second Mrs. Tanqueray*, which showed great gain in literary ability and in dramatic machinery. Between them and *The Notorious Mrs. Ebbsmith* (1895), no doubt his best play, came again a farce *The Amazons;* indeed it seems that after every serious effort he returned to the farce. Pinero's later works are: *The Benefit of the Doubt* (1895), a triumph of theatrical construction; *The Princess and the Butterfly* (1897), a charming combination of satire and romance; the graceful *Trelawney of the Wells* (1898); a study in moral evolution, *The Gay Lord Quex* (1899); the unpleasant but strong *Iris* (1901); *Letty* (1903); *The Wife With-*

out a Smile (1904); etc. All in all, Pinero ranks as a master of the problem play.

PINEROLO, *pē-nā-rō'lō*, or PIGNEROL, *pēn-yĕr-ol':* town in n. Italy, on the Clusone, at the entrance of the valley of Perosa, in the province of Turin, 23 m. by railway s.w. of the city of Turin. It was formerly strongly fortified, and was the residence of the rulers of Piedmont. It contains a new cathedral, a bishop's palace, seminaries, barracks, etc. The ruins of the *citadel*, for some time the prison of the *Man with the Iron Mask* (q.v.), are still seen on the hill of St. Brigade. Broadcloth, paper, leather, iron, and silk are manufactured. Pop. 12,000.

PINES, ISLE OF (W. Indies). See ISLA DE PINOS.

PINES, ISLE OF (or KUNIE, *kū-nē'*): island in the s. Pacific; lat. 22° 38′ s., long. 167° 25′ e.; 42 m. in circumference: discovered by Capt. Cook 1774; it belongs to France, and is a dependency of New Caledonia. The scenery is very picturesque; but the soil barren except near the coast. The island is a French convict settlement. Pop. 2,500.

PINE-SNAKE (*Pityophis*): genus of large harmless snakes, represented in the United States by the PINE-SNAKE or Bull Snake (*P. Melanoleucus*), white with black-margined blown blotches, in a triple series; length 5 ft.; found in Ohio, w. and s.; and by the Western PINE-SNAKE (*P. Sayi*), whitish or reddish, with many dark blotches or spots in a like series; length, 4–6 ft.; found eastward as far as Wisconsin. The Bull Snake is common on the prairies, but the species take their name from ocurrence in pine-woods. The genus has the dorsal scales carinated; anal plate entire; 200–240 gastrosteges.

PINE'-WOOL: fibrous substance, product of pine-leaves in some countries. Several attempts have been made of late years to utilize the leaves of pine and fir trees, cut down in vast numbers for their timber only. The leaves contain a fine vegetable fibre, which has much the appearance of cotton. In Germany, several works have been established for preparing this fibre; and it is now sold for stuffing cushions, making wadding, etc. The principal manufacture is near Breslau in Silesia.

PIN-EYED, a. *pĭn'īd* [*pin*, and *eye*]: in *bot.*, applied to those flowers in Primula which have a long style with the stigma visible at the top of the floral tube: opposed to *thrum-eyed.*

PI'NEY TREE. See CALOPHYLLUM.

PI'NEY-VARNISH. See DAMMAR.

PINFOLD, n. *pĭn'fold* [Dut. *pand;* Ger. *pfand*, a pawn or pledge: Ger. *pfandstall*, a pinfold (see PINDAR)]: a place in which cattle straying and doing damage are temporarily confined or impounded; a pound.

PING, n. *pĭng* [Low Ger. *pingeln*, to ring; *pingel*, a bell]: the sharp sound of a bullet flying past.

PING PONG, or TABLE LAWN-TENNIS: a game that was introduced from England and became very popular in the United States in 1902. The game is played very much as is the regular game of lawn-tennis. Following are the rules of the game, which should be learned thoroughly before attempting to play:

First.—The game is for two people, one standing at one end of the table, the other opposite. The player who first delivers the ball is called the server, the other the striker out.

Second.—At the end of the first game the striker out becomes the server and the server becomes the striker out, and so on, alternately.

Third.—The service is strictly underhand and delivered from beyond the end of the table.

Fourth.—The ball served must drop on the table top beyond the net, and is then in play. If it drops into the net or off the table it counts to the striker out.

Fifth.—In serving it is permissible for the ball to touch the net in passing over.

Sixth.—If the ball in play strikes any object above or around the table before it bounces on the table itself (net or post excepted) it counts against the player.

Seventh.—The server wins a stroke if the striker out fails to return the service or ball in play on the table.

Eighth.—The striker out wins a stroke if the server makes a foul or fails to return the ball in play so that it falls off the table.

Ninth.—No volleying is allowed, but so long as the ball touches the table it is in play and can be taken at half volley.

Tenth.—On either player winning his first stroke the score is called 15 for that player; on either player winning his second stroke the score is called 30; on either player winning his third stroke the score is called 40, and the fourth stroke won by either player is scored a game for that player, except as below.

Eleventh.—If both players have won three strokes (40) the score is called deuce, and the next stroke won is scored to the player. If the same player win the next stroke he wins the game; if he lose the next stroke the score is again called deuce, and so on until either player wins the two strokes immediately following the score of deuce, when the game is scored for that player.

Twelfth.—The player who first wins six games wins a set.

Thirteenth.—The game may also be scored by points, 20 up. In this case the players change the service every five points, as in cricket.

The game may be played on an ordinary dining table, about nine feet by five feet being the most convenient dimensions, though either a larger or a smaller table may be used. The net is between six and seven inches high, and the remaining accessories are posts to hold the net when stretched across the table; vellum, string or wood racquets and celluloid balls.

PINGREE, *pĭn'grē*, HAZEN SENTER: American politician: b. Denmark, Maine, 1842, Aug. 3; d. London, England, 1901, June 18. He enlisted in the Union army and served through the war, afterward settling in Detroit, Mich., where he became one of the largest shoe manufacturers in the West. In 1889 he was elected mayor of Detroit and in 1896 gained control of the Republican political organization and notwithstanding the opposition to his radical ideas was elected governor. He continued to hold his office as mayor until 1897; he was elected governor of the state, and re-elected in 1898, retiring in 1900.

PINGUIC'ULA: see BUTTERWORT.

PING-YANG', or PIENG-AN': see KANG-HOA.

PINHO'EN, OIL OF: see PHYSIC NUT.

PINION, n. *pĭn'yŭn* [L. *pinna*, a feather: F. *penne, pennon;* It. *pinna;* F. *pignon*, a pinion in wheelwork]: the last joint of a bird's wing; the whole wing of a bird; a small wheel with flaps or leaves working in another similarly constructed: V. to bind or confine, as by fastening the wings, or by binding the arms or elbows together. PIN'IONING, imp. PIN'IONED, pp. *-yŭnd*, fastened by binding the arms or elbows together.

PINITE, n. *pĭn'īt* [from *Pini*, in Saxony, where first found]: an alkaline variety of the mineral iolite, of a dirty gray, green, or brown color.

PINITES, n. plu. *pĭn'īts* [L. *pīnus*, the pine-tree]: a general term for all fossil wood which exhibits traces of having belonged to the pine tribe.

PINK, v. *pĭngk* [AS. *pyngan*, to pierce: F. *piqué*, pierced or thrust into: Gael. *punc*, a point: Gael. and Ir. *pioc;* W *pigo*, to prick, to sting: L. *pungo*, I prick]: to work eyelet-holes in; to pierce or punch with small holes; to stab. PINK'ING, imp.: N. a method of ornamentation by stamping or cutting the edges of dress materials or leather in a variety of shapes. PINKED, pp. *pĭngkt*. PINK-NEEDLE, a shepherd's bodkin. PINKING-IRON, a tool for cutting out by a blow scallops at the edges of ribbons and cloth. PINK'D PORRINGER, in *Shakes.*, a cap ornamented with eyelet-holes.

PINK, n. *pĭngk* [F. *pinque;* Dut. *pink*, a fishing-boat, a merchant vessel: comp. Icel. *espingr*, a long boat]: a narrow sterned vessel.

PINK, v. *pĭngk* [Dut. *pinken*, to wink or leer: comp. Eng. *blink*, and Ger. *blicken*, to wink, to glitter]: to wink. PINK-EYED, a. [O.Dut. *pinck-oogen*, to shut the eyes]: having small, winking, inflamed eyes.

PINK, n. *pĭngk* [F. *pince*, a tip or thin point; *pinces*, the flower pink]: flower of a brilliant color—so called from its sharp-pointed and somewhat rigid leaves; various species of the genus *Dian'thus* (see PINK, below): light-red color (see PINK COLORS): anything supremely excellent—from the *pink* being taken as the type of a flower, as 'pink of courtesy,' 'pink of perfection,' the latter used in a slightly depreciatory sense: ADJ. of the color of *pink*. PINKROOT, the root of a species of pink of India, etc., used in medicine (see SPIGELIA). PINK-SAUCER, a saucer having its inner surface covered with a pink coloring matter, used in coloring small articles. *Note.*—The preceding four entries are all connected in derivation, the fundamental idea being anything pointed and sharp—see Latham and Skeat: the probable root is Gael. *pic*, a peak.

PINK (*Dianthus*): genus of plants of nat. order *Caryophyllaceæ*, of which there are many species, annuals and perennials, with beautiful and often fragrant flowers, natives chiefly of Europe and temperate parts of Asia. The calyx is tubular, 5-toothed, with two or four scales at the base; there are 5 petals suddenly contracted at the throat of the corolla into a linear claw. There are ten stamens, and one germen with two styles. The capsule is cylindrical, and one-celled. The exquisite beauty of the flowers has attracted admiration in all ages; and some of the species have long been much cultivated in gardens, particularly the GARDEN P. and CARNATION (q.v.), which are referred often to one original, the CLOVE P. (*D. caryophyllus*), native of s. Europe, growing wild on rocks and old walls; while some botanists refer the garden pinks in part to the MAIDEN P. (*D. deltoides*), and those called Pheasant-eye pinks to the FEATHER P. (*D. plumarius*), native of parts of continental Europe, differing from the Clove P. chiefly in having the leaves rough on the margin, and the petals bearded and much cut. Nearly allied to them is *D. superbus*, found in moist places in parts of Europe, and frequent in flower-borders: it has very fragrant flowers. All the varieties of Garden P., whatever their origin, have been much changed by cultivation, and careful cultivation is requisite to preserve them in perfection. Both single and double pinks are propagated generally by *pipings*, which are short cuttings of the younger shoots. They are also propagated sometimes by layers. A rich loamy soil is best for pinks. The Clove P., in a wild state, has flesh-colored flowers: the leaves are linear-awl-shaped, grooved, and glaucous. The Maiden P. is a small, much-branched plant, growing in grassy places, on gravelly and sandy soils; it has rose-colored flowers spotted with white, and a white eye encircled by a deep purple ring.—The Deptford P. (*D. Armeria*) and the CLUSTERED P., or CHILDING P. (*D. prolifer*), differ from these in being annuals, and in having clustered flowers. The last two have become naturalized in the e. United States—*D. prolifer* near Philadelphia.—The WILD P. of N. Amer. is *Silene Pennsylvanica*, and the FIRE P. (one of the 'catchflies') is *S. Virginica*.—The GROUND or MOSS P. (*Phlox subulata*), forming beautiful mats in rocky places, and the American Sweet Williams of the same genus, belong to the family *Polemoniaceæ*.—The BEARDED P., or SWEET WILLIAM (*D. barbatus*), native of middle Europe and s. France, with lanceolate leaves, flowers crowded in dense clusters at the top of the stem, acuminated bracts, and bearded petals, has long been a favorite garden-flower, still retaining its place alike in palace and cottage gardens. Although perennial, it is sown annually by florists, to secure fine flowers, and there are many varieties, single and double, exhibiting much diversity of color.—The INDIAN P., or CHINA P. (*D. Chinensis*), also is common in flower-gardens.

The Clove P. was formerly regarded as possessing medicinal properties, and was used in nervous maladies.—*Sea P.* is a common name of Thrift (q.v.).

PINK COLORS: very light shades of rose-red color: produced usually by extreme dilution of cochineal or carmine, Brazil and Braziletto wood colors, with whiting. Some mineral pinks for oil colors are obtained from preparations of manganese, etc.: see RED COLORS. The term pink is applied also to several Yellow Colors (q.v.).

PINKERTON, *pĭngk'ĕr-ton*, ALLAN: detective: 1819, Aug. 25—1884, July 1; b. Glasgow, Scotland. He learned the cooper's trade, went to Montreal 1840 to avoid imprisonment for advocating chartist principles, and soon removed to Chicago. He became deputy-sheriff, was appointed detective by the city govt. of Chicago 1850, and established his famous detective agencies in large cities (see DETECTIVES). He discovered and frustrated the plot to assassinate Pres.-elect Lincoln on his way to Washington, and organized and was the first chief of the secret service force in the Union army. He broke up many gangs of desperate criminals, including the Mollie Maguires, and recovered large sums of money from bank robbers. His literary work was confined to detective stories, of which about 15 were published. He died at Chicago.

PINK'ERTON, JOHN: industrious and learned *littérateur:* 1758, Feb. 17—1826, Mar. 10; b. Edinburgh. He was educated at the grammar school of Lanark, and was apprenticed to a writer to the signet. In 1780 he settled in London as a man of letters. In the next three years he published collections of *Scottish Ballads,* professedly ancient; but many were really his own compositions—*forgeries,* some might say. His *Essay on Medals,* 1784, long held a high place among books on numismatics. *Letters on Literature,* 1785, were marked chiefly by novel and absurd orthography. P.'s most valuable publication was *Ancient Scottish Poems never before in Print, from the MS. Collections of Sir Richard Maitland of Lethington, Knight* (2 vols. Lond. 1786). His *Dissertation on the Origin and Progress of the Scythians or Goths,* 1787, is notable for grotesquely virulent hatred of the Britanno-Celtic race—Scotch Highlanders, Welsh, and Irish—that reaches its absurd and savage climax in his *Inquiry into the History of Scotland preceding the Reign of Malcolm III.* (2 vols. Lond. 1790): nevertheless the *Inquiry* contains much important matter—rare and curious historical documents, some of which are found nowhere else in print. P. died in Paris, whither he had removed 1802. He published many other historical, geographical, and antiquarian works: among these is *The History of Scotland from the Accession of the House of Stuart to that of Mary* (2 vols 1797), valuable for laborious investigation of original materials, but disfigured by an imitation of the grandiose style of Gibbon. His *Walpoliana* was a collection of his friend Horace Walpole's conversations, 2 volumes.

PINK-EYE: form of influenza, affecting horses. It is accompanied by debility, congestion of the blood-vessels of the eyes, with watery discharge therefrom, swelling of the limbs, staring coat, poor appetite, and general derangement of the digestive functions A nasal discharge usually commences in a few days. The subject should be promptly isolated, have perfect rest, pure air, a moderate degree of light, plenty of water from which the chill has been taken, and a rather spare diet. If the limbs are cold they should be rubbed, and flannel bandages are sometimes required. In severe cases a veterinarian should be called, as serious complications are liable to occur.

PINKNEY, *pĭngk'nĭ*, WILLIAM, LL.D.: statesman: 1764, Mar. 17—1822, Feb. 25; b. Md. He studied law, and became eminent as a practitioner. He was a member of the Md. convention 1788, to ratify the federal constitution; a state councilor, member of the state house of delegates, and state senator. He was a commissioner to England under the Jay treaty, 1796. In 1805 he was atty.gen. of Md. In 1806 he went to England as minister extraordinary, and was minister resident at the court of St. James 1807–11. He served as atty.gen. of the United States 1811–18. In the war of 1812 with England P. commanded a corps of volunteers, and was severely wounded at the battle of Bladensburg. In 1815 he was elected to congress, and 1816 was appointed by the pres. minister to Russia. In 1819 he was elected senator of the United States. P. had unusual legal ability, and natural gifts as writer and orator.

PIN'NA: genus of lamellibranchiate mollusks of the same family with the *Pearl Mussel* (*Aviculidæ*), and having a shell of two equal wedge-shaped valves, closely united by a ligament along one of their sides. The mantle is closed on the side of the ligament; the foot is small and conical. The byssus is remarkably long and silky; and by it the species affix themselves to submarine rocks and other bodies, sometimes even to sandy or muddy bottoms. The best known species is *P. nobilis*, native of the Mediterranean, the byssus of which was used by the ancients for fabrics, but chiefly as an article of curiosity, to which a great value was attached. It is still so used in Sicily and elsewhere. It is very strong and lustrous. The only reason against its more general use is the difficulty of procuring it in sufficient quantity. The byssus of this species is sometimes two ft. long, the shell is about the same length. Pinnæ are found often in large beds, with only the edges of their shells appearing above the mud or sand. The animal is eaten.

PINNA, n. *pĭn'nă*, plu. PINNÆ, *pĭn'nē* [L. *pinna*, a feather]: in *science*, a name applied to the fin of a fish, or to the feather or wing of a bird; in *anat.*, the part of the external ear which projects beyond the head; in *bot.*, the leaflet of a pinnate leaf

PINNACE, n. *pĭn'nās* [Sp. *pinaza;* F. *pinasse;* It. *pinassa*, a small vessel—from L. *pīnus*, a fir-tree, because originally constructed of pine-wood]: originally a small vessel, usually schooner-rigged, but capable of being propelled by oars; employed as tender to a large ship, for communicating with the shore, etc. At present, however, the signification is frequently a large boat carried by great ships; smaller than the launch, but larger than the cutter; and generally rowed 'double-banked,' with 8 to 16 oars. In poetry, P. is any light vessel.

PINNACLE, n. *pĭn'nă-kl* [F. *pinacle*—from It. *pinacolo*, a pinnacle, a battlement: L. *pinnaculum*, a pinnacle—from *pinna*, the fin of a fish, a feather, a pinnacle]: slender turret elevated above the main building; the highest point or part of a building. V. to furnish with pinnacles. PIN'NACLING, imp. *-kling.* PIN'NACLED, pp. *-kld:* ADJ. furnished with pinnacles.—*Pinnacle* is an ornamental termination much used in Gothic architecture. It is of simple form in the earlier periods of the style; having a plain square or octagonal shaft and sloping roof or top, terminating with a finial; but in later examples, the pinnacle is greatly developed, and becomes one of the most varied and beautiful features of the style. It is ornamented with shafts bearing canopies, and niches filled with statues. Pinnacles are most frequent on buttresses and parapets: on buttresses, they serve as a deadweight to increase their power of resisting a thrust.

PINNATE, a. *pĭn'nāt*, or PIN'NATED, a. *-nā-tĕd* [L. *pinnātus*, feathered—from *pinna*, a feather or fin]: in *bot.*, a compound leaf having several leaflets attached to each side of a central rib; feathered; winged or lobed. *Note.*—If the leaflets are in pairs, they are equally—that is *paripinnate;* if terminated by an odd leaflet, they are unequally—that is, *imparipinnate.* PINNATIFID, a. *pĭn-năt'ĭ-fĭd* [L. *findo*, I cleave; *fidi*, I have cleft]: applied to leaves divided into segments or jags like those of the common groundsel. PINNAT'IPAR'TITE, a. *-pär'tīt* [L. *pars*, or *partem*, a part]: in *bot.*, applied to a simple leaf cut into lateral segments, the divisions extending nearly to the central rib. PINNAT'IPED, a. *-pēd* [L. *pes*, or *pedem*, a foot]: having the toes bordered by membranes, as some birds; fin footed. PINNIPED, a. *pĭn'ĭ-pēd*, applied to certain crabs that have their hinder feet flattened like a fin for swimming. PINNAT'ISECT, a. *-sĕkt* [L. *sectus*, cut]: applied to a simple leaf divided to the midrib in a pinnate manner.

PINNER, n. *pĭn'ĕr* [see PIN 1]: a pinafore; an apron with a bib pinned in front of the dress; the loose lappet of a head-dress.

PINNIGRADE, a. *pĭn'nĭ-grād* [L. *pinna*, a feather or fin; *grădior*, I walk]: denoting one of the group of the PIN'NIGRA'DA, *grā'dă*, moving on short feet that serve as paddles, including seals and walruses; fin footed.

PINNIPE'DIA: same as PINNIGRADA: see SEAL.

PINNULATE, a. *pĭn'nū-lāt* [L. *pin'nula*, a little fin or feather]: applied to a leaf when its leaflets are again subdivided. PINNULE, n. *pĭn'nūl*, in *bot.*, one of the leaflets of a pinnate leaf, or of one which is bipinnate, tripinnate, etc.: see LEAVES. The term is in more frequent use, however, to designate the ultimate divisions of the fronds of ferns, when divided in the same manner.

PINOLE, n. *pĭn-ōl'* [Ital.]: an aromatic powder used in Italy for making chocolate; the heart of maize baked, ground, and mixed with sugar. It is dissolved in water to form a beverage.

PINOLIN, n. *pīn'o-lĭn* [L. *pinus*, *oleum*]: in *chem.*, a volatile oil produced by the distillation of American pine-resin, and used as an illuminating material.

PINSK, *pĭnsk:* town of w. Russia, govt. of Minsk, surrounded by vast marshes called the P. Marshes; on the banks of the Pina, a branch of the Pripet; 752 m. s.s.w. of St. Petersburg, lat. 52° 7′ n., long. 26° 6′ e. It was founded in the 12th c., was conquered by the Prince of Lithuania 1320, was annexed, with Lithuania, to Poland 1569, and came at last into the possession of Russia 1795. The trade of P., chiefly transit, has increased, especially since the opening of the Oghinsky canal, which connects the Dnieper and the Black Sea with the Niemen and the Baltic Sea. A considerable number of ships and barges enter and clear the port, laden principally with salt, corn, hemp-seed, iron, glass, tar, tallow, wool, tobacco, and timber. The manufacturing activity is not great. The project for a branch line of railway (55 m.) connecting P. with the main line to Minsk, has been sanctioned. Of the people, three-fourths are Jews, and have the trade almost entirely in their own hands. Pop. (1890) 32,480; (1897) 27,938.

PINT, n. *pīnt* [Sp. *pinta*, a spot or mark, a pint—from *pintar*, to paint: Dut. *pint;* F. *pinte*, a pint: L. *pictus*, painted—from *pingĕrĕ*, to paint: measure so called because marked or pointed off in the interior of a larger measure]: measure of capacity used both for liquid and for dry substances, and equivalent to the eighth part of a Gallon (q.v.), or 34·65925 cubic inches. The Scotch pint, still in use, though superseded as a legal measure, is equivalent to 3·00651 pints.

PINTA'DO: see GUINEA FOWL.

PIN'TAIL, or PINTAIL DUCK (*Dafila*): genus of ducks, of the section with the hind-toe destitute of membrane. The bill is without tubercle at the base, narrow, with laminæ not projecting beyond the margin. The tail of the male is long, and tapers to a point.—The COMMON P. (*D. acuta*) is a handsome bird, rather longer in shape than most of the ducks; the neck also longer and more slender. It is about equal in size to the mallard. The head of the male is rich dark brown, with a white longitudinal line on each side down the neck; the back and sides marked with waving lines of black and grayish-white; the lower parts white, the elongated central tail-feathers black; feet grayish-blue. The young and the female have the whole head and neck

finely marked with brown, the back with light angular or rounded bars on each feather. It is a native of all n. parts of the world, migrating southward in winter. It also frequents fresh-water lakes and ponds, and is common in winter in the lower valley of the Mississippi. Its winter range

Pintail Duck (*Dafila acuta*), Male.

extends southward to the Mediterranean and the Gulf of Mexico, and even to Africa and the W. Indian Islands. Its flight is very rapid and noiseless. It is esteemed for the table. It has been tamed, and has bred in confinement.

PINTARD, *pĭn-tärd'*, JOHN, LL.D.: 1759, May 18—1844, June 21; b. New York. He graduated from Princeton College 1776; was connected with the commissary department of the revolutionary army, and afterward engaged in the shipping business. He was a member of the N. Y. legislature 1787, for a short time edited the *Daily Advertiser*, visited Louisiana, and was influential in securing its purchase by the govt., engaged in the insurance business, organized the first savings-bank in New York, was sec. of the chamber of commerce, was one of the founders of the historical societies of N. Y. and Mass., and of the American Bible Soc., and was connected with other important public enterprises. He wrote for periodicals and translated into French the *Book of Common Prayer*. He died in New York.

PINTLE, n. *pĭn'tl* [dim. of PIN, which see]: a little pin; a long iron bolt to prevent the recoil of a cannon.

PINTLE, n. *pĭn'tl* [a corruption of *pen'dulum*, in the sense of that which is hung—from L. *pendĕo*, I hang]: in a *ship*, a hook on which a rudder is hung to its post.

PINXIT, v. *pĭngks'ĭt* [L. he painted it]: word appended to a picture or engraving with the artist's name prefixed, as Vandyke *pinxit*, painted by Vandyke.

PINY: see under PINE 1.

PINZON, *pēn-thōn'*, Martin Alonzo: navigator: 1441–93; b. Palos de Moguer, Spain. After becoming a skilful pilot he engaged with his brothers in ship-building. While at Rome on business he heard of and investigated the claims of Columbus concerning the new world. He favored the proposed plan, aided in fitting out the expedition of discovery, and commanded one of the vessels, but caused much trouble by his jealousy and insubordination. On the return trip he separated from Columbus and endeavored to reach home, report the discovery of land, and claim the honor therefor before the latter should arrive. Being detained by a storm he did not reach Palos till a few hours after Columbus had landed. His conduct on the voyage and his effort to supplant his commander becoming known, he was not allowed to appear at court. He died soon after his return to Spain.—His brother, Francisco Martin P. (about 1462–1500); b. Palos de Moguer, Spain. He was a pilot on the ship commanded by his brother, Martin Alonzo P., in the expedition under Columbus which discovered the new world, and was equally opposed to the great discoverer. He succeeded his elder brother as manager of the ship-building business in which they had been engaged; and 1499 was a pilot in the expedition which resulted in the discovery of Brazil. He was lost with his ship and all on board while on the homeward voyage.

PINZON, *pēn-thōn'* (or Pinçon), Vicente Yañez: discoverer of Brazil: one of three brothers born in Spain about the middle of the 15th c. and associated with Columbus in his discovery of America. Vicente commanded the *Niña*, besides giving material assistance to Columbus. He sailed from Palos 1499, Nov. 13, with four caravels, and reached Cape St. Augustine, the easternmost point of the S. American continent, 1500, Jan. 20. Following the coast as far as the mouth of the Orinoco and entering the mouth of the Amazon, he took possession of the country in the name of Spain, and then followed the coast-line n.w. as far as Costa Rica, and touched at Hayti, losing two of his vessels among the Bahamas. He returned to Spain 1500, Sep. Concessions were made to him by the Spanish crown, and he was created gov. of the territory discovered; but he did not take possession. He sailed along the e. coast of S. America with Juan Diaz de Salis 1508, in hope of finding a w. passage to the Spice Islands; but they were unsuccessful. All record of him is lost after 1523.

PIOMBINO, *pē-ōm-bē'nō:* principality now incorporated in the kingdom of Italy; along the Italian coast opposite the island of Elba, the greater part of which belonged to it: extent about 132 sq. m.; pop. previous to its incorporation with the rest of Italy, about 25,000. P. was originally a fief of the empire, and, at the end of the 14th c., came into the possession of the family of Appiani, which, after ruling it nearly 300 years, made way for a new dynasty, the family of Buoncompagni. This latter dynasty was mostly under the suzerainty of the neighboring states of Sardinia and Naples alternately. In 1801 the Buoncompagni family were expelled by Napoleon, and the principality given

to his sister Elisa, wife of Felice, Prince Baciocchi; but the latter was ejected, and the old dynasty restored, by the congress of Vienna; the principality being then put under the suzerainty of Tuscany, whose grand-duke indemnified the Buoncompagni for their loss of sovereignty. It is now part of the province of Pisa, in the kingdom of Italy. The strait between P. and Elba is called the 'Channel of Piombino.'

PIONEER, n. *pī'ŏ-nēr'* [F. *pionnier*, a pioneer: OF. *peonier*, a foot-soldier: Sp. *peon;* F. *pion*, a day-laborer, a pawn in chess: mid. L. *pedōnĕs*, foot-soldiers]: one of a company of soldiers trained to work with pickax, spade, etc., and employed in the field to clear the road before an army, throw up works, dig trenches, build bridges, etc.; one who goes before to prepare the way for another: V. to clear the way for. PI'ONEER'ING, imp. PI'ONEERED', pp. *-nērd'*.

PIONY, n. *pī'ŏ-nĭ:* the *peony*, which see.

PIOTRKOW, *pē-otr'kov:* capital (since 1867) of one of the 10 govts. into which Poland was then divided. It is near the Warsaw and Vienna railway. It is one of the oldest Polish towns; here in the 15th and 16th c. diets were held, and kings elected. In 1702 P. was burnt by the Swedes; in 1709 the Russians gained a battle here. Pop. About 25,000.

PIOUS, a. *pī'ŭs* [OF. *pieus*, and *pius;* Sp. and It. *pio;* F. *pieux*—from L. *pĭus*, pious]: devout; religious; done under the guise of religion, in an ill sense, as a pious fraud. PI'OUSLY, ad. *-lĭ*. PI'OUSNESS, n. *-nĕs*, the quality of being pious. PIETY, n. *pī'ĕ-tĭ*, which see. PIOUS-MINDED, a. disposed to reverence and honor the Supreme Being; of a pious disposition.—SYN. of 'pious': holy; godly; righteous.

PI'OUS-BELIEF', or PIOUS-OPINION, in Rom. Cath. Theol.: belief or opinion universally or almost universally prevalent in the church as to some event or theological proposition, concerning which no definition has been made. The Assumption of the Virgin Mary is an example.

PIOZZI, *pē-ŏz'ĭ*, It. *pē-ŏt'sē*, HESTER LYNCH (SALUSBURY): [THRALE]: a woman not to be forgotten while Dr. Samuel Johnson is remembered: 1739—1821, May 2; b. Bodvel, in Caernarvonshire, Wales; daughter of John Salusbury. Early introduced into the fashionable world of London, she charmed by her beauty and her lively manners; and, 1763, was married to Henry Thrale, a rich brewer, with a recognized position in society, and, at the time, one of the members for the borough of Southwark. Her acquaintance with Dr. Johnson, which speedily became an affectionate intimacy, began shortly afterward. Of all Johnson's many friendships, this was, in some essential respects, the most valuable to him. To Johnson, widowed and alone, and subject, as he had ever been, to accesses of a frightful gloomy hypochondria, which made life at times to him an almost intolerable burden, the society of Mrs. Thrale, and of the circle which she gathered

round her, was an incalculable solace. Mrs. Thrale in particular, with her warm heart, and bright womanly intelligence, was always a comforting presence; and her unfailing cheerfulness and vivacity enlivened for him many an otherwise cloudy hour. Her married life, though prosperous, was not eminently happy, Mr. Henry Thrale, though always pleasant and kindly, being no specimen of conjugal virtue. Though Johnson owed her much, it may be surmised that the benefit was in some sort reciprocal, and that, by her affectionate reverence and solicitude for her sage, she consoled herself for the gentlemanly indifference of her husband. On the death of her husband, 1781, Mrs. Thrale retired with her four daughters to Bath, where, 1784, she married Gabriel Piozzi, Italian teacher of music. This *mésalliance*—as it was held—was deeply censured by all her friends, and so unreasonably excited the ire of Dr. Johnson in particular, that a rupture of friendly relations was the result. In the correspondence between them on the subject, it must be admitted the lady has much the better of the philosopher, whose tone of unmannerly rudeness gives some countenance to the good-natured suspicion of his friends that he had an eye to the widow himself. Though the feud was ostensibly healed, the friends never again met; Mrs. P. leaving England for Italy with her husband, and Dr. Johnson dying soon after. A little time after Johnson's death she published an octavo volume, *Anecdotes of Dr. Samuel Johnson during the Last Twenty Years of his Life*, in which it seemed to the indignant Boswell and others that her main intention was to take her little feminine revenge on the deceased for his outrage in the matter of Piozzi. This work she supplemented 1788 by a collection of *Letters to and from Dr. Samuel Johnson*, 2 vols. 8vo. Her other books have long since been utterly forgotten. Having survived her second husband, her own celebrity, and almost that of the great Dr. Johnson, Mrs. P. died at Clifton, near Bristol.

PIP, n. *pĭp* [a contraction of PIPPIN, which see: F. *pepin*, the seed of fruit, as of an apple or grape]: the seed of an apple, orange, and the like; a cherry-stone; the spot or single on a card: V. to cry as a chicken. PIP'PING, imp. PIPPED, pp. *pĭpt*. PIP, a spot on cards, is referred to OF. *picque*, a spade at cards—see Skeat.

PIP, n. *pĭp*, or CHIP, or ROUP [Ger. *pipps;* Dut. *pipse*, the mucus of the nose: F. *pepie;* It. *pipita*, pip—from L. *pitŭīta*, phlegm, gummy moisture]: disease of poultry, often very fatal, particularly to chickens and turkey poults; frequent also in young pheasants. Adult birds are liable to it; and when it appears in a poultry-yard, it often attacks many in rapid succession, so that it is regarded as highly contagious. It most frequently occurs in wet or very cold weather, and is described generally as a kind of catarrh, though perhaps it might be called more accurately a kind of influenza. It begins with a slight hoarseness and catching in the breath, followed by offensive discharge from the nostrils and eyes, rattling in the throat, and an accumulation of mucus in the mouth, form-

ing a 'scale' on the tongue. The communication of the disease from one bird to another is supposed to take place through the contamination of the water in their common drinking-vessel; therefore a bird affected with it should at once be removed from the rest. Castor-oil is freely administered by some poultry-keepers. *The Henwife* recommends also a medicine composed of half a drachm of dried sulphate of iron, and one drachm of capsicum, made into 30 pills with extract of licorice—one pill to be given three times a day. This after a time is to be followed by another compound of sulphate of iron, cayenne pepper, and butter. The eyes, nostrils, and mouth are to be washed with vinegar. In Wright's *Practical Poultry-Keeper* it is specially recommended that the diseased birds should be kept warm; they are to be fed on oatmeal mixed with ale, and to have plenty of green food.

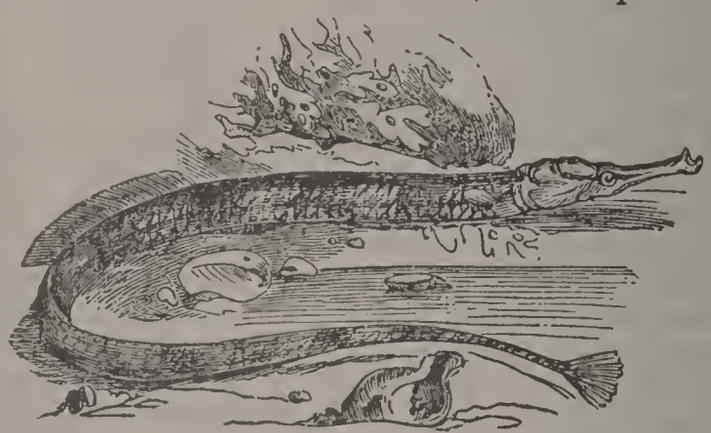
PIPA, *pī'pâ:* genus of batrachians, in general form resembling frogs and toads, and characterized by the very broad and triangular head, whose sides are destitute of the glands (*parotoids*) so large in the true toads; the eyes small, and near the margin of the lower jaw; the ear concealed beneath the skin; the tongue merely rudimentary; the jaws destitute of teeth; the fore-feet not webbed, but divided into four fingers, each of which divides at the extremity into four small points, these, again, being minutely divided in a similar manner; the hind-feet five-toed and completely webbed; the larynx of the male extremely large—a triangular bony box, within which are two small movable bones for occasionally closing the entrance of the bronchi; the back of the female furnished with numerous cells or pouches, in which the eggs are hatched, and the young undergo all their transformations till they have attained a form similar to that of their parents. These characters are so remarkable as to make the creatures of this genus objects of peculiar interest; but particularly as to their mode of rearing the young. It was at first supposed that the young were produced in some unusual way in the cells from which they were seen finally to emerge; but this is not the fact. The eggs are deposited by the female in the ordinary manner, and are carefully placed by the male in the cells of her back, which close over them. When the young are ready to use their limbs, they struggle out of the cells, to which they never return. The best-known species of P. is that commonly called the Surinam Toad (*P. Surinamensis*), native of Guiana and other warm parts of continental America, where it inhabits swamps and ditches, and is found occasionally in damp and dirty corners of houses. It is sometimes seven inches long; its color is brownish-olive above, whitish below; the skin covered with small hard granules, mingled with occasional horny tubercles. The whole aspect of the creature is hideous.

PIPE, n. *pīp* [Dut. *pijp;* Dan. *pibe;* Ger. *pfeife*, a pipe. also Gael. *piob;* Ir., *pib;* W. *pib*, a pipe, a tube]: thin hollow cylinder; a tube; a long tube or cylinder for conveying water, gas, steam, etc. (see PIPES or TUBES): a wind musical instrument consisting of a pipe or tube of wood or metal; the key or pitch of the voice; tube of clay or wood, etc., of the diameter of a goose-quill, with a turned-up open head, for smoking tobacco (see TOBACCO-PIPES): the roll of creditors in the British exchequer: V. to play on a pipe; to send forth a shrill sound; to call by means of a pipe or whistle, as in a ship. PI'PING, imp.: ADJ. weak; feeble, as 'the *piping* time of peace'; sickly—from the weak voice of the sick; playing on the pipe; boiling hot, as water: N. the act of one who pipes; a kind of cord trimming or fluting for ladies' dresses. PIPED, pp. *pīpd.* PIPAGE, *pī'pāj*, distribution or conveyance by means of pipes, as of petroleum, gas, water, etc. PI'PER, n. *-pėr*, one who plays on a pipe; a native species of gurnard which utters a noise when taken out of the water. PIPES, n. plu. *pīps*, a musical instrument consisting of a collection of pipes or tubes. PIPE-CLAY, grayish-white clay (see below). PIPE-COUPLING, joint by which 2 pipes are connected, or by which a pipe is connected with another object PIPE-FISH, fish having a long slender body of the thickness of a swan's quill (see below). PIPE-LAYING, act of laying pipes for the conveyance of water, gas, etc.: in a figurative sense, laying plans for carrying out of a scheme or purpose; used particularly of the scheming of political managers. PIPE-LINE, pipe conduit under ground for conveyance of fluids; specifically of iron pipe for conveyance of petroleum from the oil wells to a distant market or a refinery. The Penn. oil regions are connected by pipe-lines with both New York and Chicago. TO PAY THE PIPER, to pay the expense, as at an entertainment, where the presence of a paid piper used to be deemed indispensable.

PIPE, n. *pīp* [F. *pipe*, a barrel of wine; in OF. a tube, a nozzle: Dut. *pijp*, a pipe, a tube]: measure of quantity common in Portugal, Spain, France, and in some other countries which trade with these: used almost exclusively for wine and oil, and with a particular value for almost each locality The pipe is called in England a butt, and is equal to two hogsheads, or half a tun. The pipe of Oporto is larger than those of Lisbon and of Spain in the proportion of 93 to 76. There are three different measures of this name in France; and there was formerly a pipe, a measure of capacity for dry substances, in use by the Bretons. But the pipe in England varies with the kind of wine that it contains: a pipe of port contains 114 imperial gallons; of sherry, 108 imperial gallons; and of madeira, 92 imperial gallons; while the common English pipe contains 126 wine gallons, or 105 imperial gallons nearly.

PIPE'CLAY: a fine Clay (q.v.), free from iron and other impurities, having a grayish-white color, a greasy feel, and an earthy fracture. It adheres strongly to the tongue, and is very plastic, tenacious, and infusible. It is used for manufacture of tobacco-pipes and white pottery, and by soldiers for cleaning their white trousers, and especially their belts.

PIPE'-FISH (*Syngnathus*): genus of osseous fishes of order *Lophobranchii* (q.v.), and family *Syngnathidæ*. In this family the form is elongated, there is little flesh, and the body is almost covered with partially ossified plates; the head is long; the jaws are elongated to form a tubular snout—whence the names P. and *Syngnathus* [Gr. *syn*, together; and *gnathos*, a jaw]; and the males have pouches, variously situated, in which they receive the eggs of their mate, and carry them till they are hatched. The family *Syngnathidæ* is sometimes restricted to those in which the egg-pouch of the males is on the tail, and is open through-



Pipe-fish (*Syngnathus acus*).

out its whole length, and the tail is not prehensile. Thus restricted, it contains a number of genera. Three or four species occur on the Atlantic coast of N. Amer.—The Great P. (*Syngnathus acus*) is found sometimes in deep water, and sometimes at low tide among sea-weed in rock-pools. The specimens commonly seen are 12 to 16 inches in length; but this fish is said to attain a length of 2 or 3 ft. Its food, and that of the other species, is believed to consist of small marine animals and eggs of fishes; and it may be seen slowly moving about, with curious contortions, poking its long snout into every crevice in search of food, and sometimes assuming a vertical position with the head downward, poking into or stirring the sand. This and the other pipe-fishes show great affection for their young, which are believed to return, on the appearance of danger, to the pouch of their male parent, after they have begun to leave it and to swim about in the sea.

The name P. is sometimes given also to the fishes forming the family *Fistularidæ* (q.v.), or Flute-mouths, called sometimes *Pipe-mouths*.

PIPERACEÆ, *pī-pėr-ā'sē-ē:* natural order of exogenous plants, natives almost exclusively of the hottest parts of the globe, particularly of Asia and America. None are found in cold regions. About 600 species are known, to most of which the name PEPPER is sometimes given; though some are known by other names also, particularly those of which the fruit is not used as a spice, but of which some part is employed for some other purpose, e.g., Betel, Cubebs, Matico, and Ava. (See these titles.) But Pepper (q.v.) is the most important product of the order. Of the P., a few are almost trees; but they are generally shrubs or herbaceous plants, often climbing. They have jointed stems; opposite whorled or alternate leaves, with or without stipules, and insignificant greenish flowers in slender spikes, unisexual or hermaphrodite, the different kinds generally mingled in the same spike; the flowers without calyx or corolla, but each with a bract, the stamens 2–6, the ovary with one cell and one ovule, and crowned with one or three stigmas; the fruit somewhat succulent, containing one seed.

PIPER BETLE, n. *pī'pėr be'tl* [L. *piper*, pepper: Sp. *betle*, betel]: the betel-pepper, a plant whose leaf is used with areca-nut for chewing by Malays, etc.: see under BETEL.

PIPERINE, n. *pĭp'ėr-ĭn* [L. *pĭper*, pepper: F. *pipérin*], ($C_{17}H_{19}NO_3$): alkaloid possessing very weak basic properties, which is found in the Pepper tribe. It may be obtained by heating powdered pepper with alcohol, which extracts the P. and some resinous matter, which may be removed by digestion in a solution of potash. It crystallizes in colorless tetragonal plates, tasteless and odorless; is insoluble in cold water, but dissolves readily in alcohol and ether: the alcoholic solution has a sharp, peppery taste: the crystals melt at 100° C. (212° F.) to a pale-yellow, limpid oil. On heating P. with soda-lime, a remarkable oily base, *Piperidine* ($C_5H_{11}N$), is obtained, with pungent odor, resembling that of both ammonia and pepper. It boils at 106° C. (222·8° F.), is soluble in alcohol and ether, and has a strong alkaline reaction.

PIPES.

PIPES, or TUBES: long hollow cylinders of various materials and for various purposes; e.g., draining-pipes for agricultural and sanitary purposes, made of earthenware, wood, and metal; pipes of various metals for a great variety of purposes; and Tobacco-pipes (q.v.), of various materials. Wooden pipes, formerly used for conveying water and for draining, have given place to pipes of metal and earthenware. For agricultural purposes *drain-tiles* are of ordinary brick-clay; and are produced very rapidly and cheaply by machinery. They are of various sizes: a common size is 15 inches in length by 2½ inches diameter. The operation of the drain-tile machine is to squeeze a continuous length of soft plastic clay through a ring-shape orifice, the centre of which is occupied by a core or mandrel of the size of the hollow part of the pipe. Another arrangement of the machine is to cut the pipe to the proper lengths as it passes through, and by means of a travelling-table, to carry these forward to be removed to the sheds, where they are dried, previous to being burned in the kilns.

Earthenware pipes are now made of almost every size, from an inch or two in diameter to the great size of 54 inches. They are usually of fire-clay, and glazed like common pottery: see POTTERY. They are wider at one end, so as to form a socket, as in fig. 1, to receive the end of another, and thus form a continuous tube. These are greatly used for the drainage of houses, and for sewering, for which they are

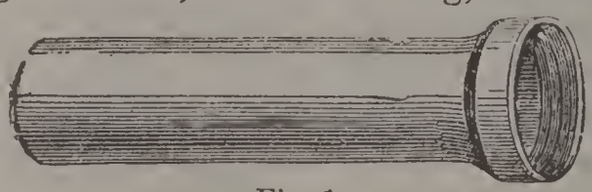


Fig. 1.

admirably adapted: the inner surface being glazed as well as the outer, offers no resistance to sedimentary matters, which are consequently carried away readily. These pipes are of great strength. Instead of the ordinary socket-jointed circular pipes, Norman Shaw, one of the leading architects of London, uses a culvert of an egg-shaped section, open all along the top, with a rebated flange to receive flat covers. About the laying of these covers there is no difficulty, and when laid they can be inspected from end to end, each joint examined, and the uniformity of the fall tested accurately. Should an imperfectly laid culvert be detected, it is easily taken out and another put in its place. When the culverts are found to be all well laid, and when the whole has been examined, the loose covers are laid in and pointed with cement, and then the whole covered over with portland cement. If at any time the drain has to be examined, it is at least as easy to cut through the cement bed and chip out a covering tile as to cut a hole in a drain-pipe. But in fact, as the culverts can be laid correctly, there will very rarely be any occasion for cutting into them. They can be made of glazed earthenware or of Portland cement. Another kind, for chimney flues, are also made of fire-clay, but unglazed externally, and so thick, that there is little fear of breaking. They are placed one on another and are built into the walls of houses.

instead of the ordinary chimneys, and in this way save much labor in building, and afford a much more effective, and easily cleaned flue (fig. 2). *Caoutchouc vulcanized* and *gutta percha* are also extensively used for making pipes for a variety of purposes, their flexibility rendering them very useful. *Leathern pipes* are chiefly for temporary conveyance of water, as in the case of fire-engines: they are generally called *hose*. Metal pipes are of iron, lead, tin, or an alloy of tin and lead, copper, brass, etc. Iron pipes are used for water and gas distribution, and their manufacture has become of enormous extent, for supply of the vast water and gas systems in cities and towns.

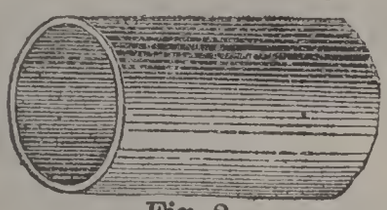
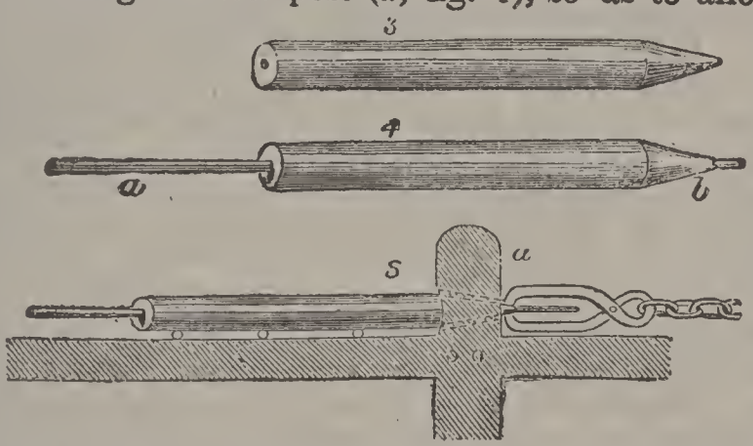


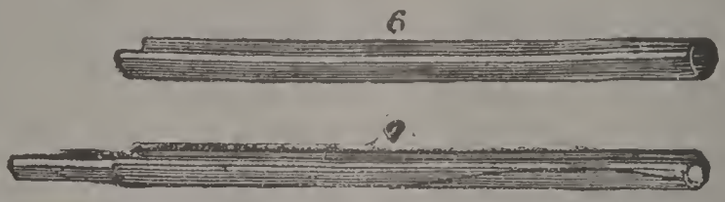
Fig. 2.

Pipes made from brass, copper, and tin are made by first casting an ingot of the metal into the shape shown in fig 3, with a hole through its length of the same diameter as the intended bore of the pipe. Into this is placed an iron rod, called the mandrel (*a*, fig. 4), which exactly fits, and which projects slightly at the tapered end (*b*, fig. 4). It is then brought to the drawing-table, and here the small end with its projecting mandrel is put into a funnel-shaped hole, drilled through a steel post (*a*, fig. 5), so as to allow the



point to be griped on the other side by a pair of pincers, at the end of a strong chain; the machine-power is then applied to the other end of the chain, and the soft metal and its mandrel are drawn through, the former being extended equally over the surface of the latter, which is then removed, and the length of pipe is complete. Some metals require repeated drawing through holes, gradually diminishing in size, and have to be softened or annealed at intervals, as the metal hardens under repeated drawing. In this way, brass, copper, tin, steel, and pewter pipes are made. Lead pipes are made of great lengths by squeezing the soft hot metal through a hole in a steel plate in which is a fixed core or mandrel projecting, which forms and regulates the size of the bore of the pipe. Pipes are also made from copper, brass, and sheet iron by rolling out narrow strips of metal, and then passing them successively through rollers, which are deeply grooved, and which turn up the edges (fig. 6). A mandrel is then laid in it, as in fig. 7, and it is next passed through double-grooved rollers, which turn the

edges in, and thus form a complete tube round the mandrel. The edges require soldering, or if of iron, welding. Welded iron tubes of this description are used to an immense extent for gas and steam distribution, and for construction of locomotive and tubular boilers. The weld may be a 'but-



weld,' or for greater strength a 'lap-weld.' All boiler tubes used to be made in this way; but the method of drawing has lately been so much improved, that copper and brass pipes, or tubes, as they are frequently called, are now drawn of considerable thickness and diameter.

Two recent developments are the spiral sheet metal pipes and the seamless Mannesmann pipes. The first are made from strips of sheet metal wound spirally in a machine and riveted or welded at the seam as fast as wound. These are very extensively used in this country. These tubes, invented by the brothers Mannesmann, of Germany, are made by rolling a mass of steel at welding heat between peculiarly corrugated tapered rollers whose axes are inclined to each other. In this way the metal is so drawn that it is forced into a tubular shape without the necessity of any mandrel. It is one of the most remarkable of recent metallurgical inventions. It is possible to roll the metal so as to form a long tube closed hermetically at both ends. A mandrel is generally used, but is not indispensable, as it acts but a secondary part, the tube-forming action coming from the rolls.—Seamless steel tubes have acquired some importance in their application to the construction of bicycles.

PIPE'-STICKS: wooden tubes used for some tobacco-pipes. Among the most prized are the Agriot or Cherry pipe-sticks of Austria; the young stems of the Mahaleb Cherry (*Prunus Mahaleb*) which is extensively grown for the purpose in the environs of Vienna. Excessive care is bestowed on the cultivation of these shrubs, which all are raised from seed. When the seedlings are two years old, they are each planted in a small pot, and as they grow every attempt at branching is stopped by removing the bud. As they increase in size from year to year, they are shifted to larger pots or boxes, and great care is taken to turn them round almost daily, so that every part is equally exposed to the sun. When they have attained sufficient height, they are allowed to form a small bushy head, and continue to receive the same attention in daily turning, etc., until they are thick enough in the stem. They are then taken up, and the roots and branches removed, and the stem put by to season. Afterward they are bored through, and are ready for use. These pipe-sticks have an agreeable odor, and are covered with a reddish-brown bark, which is retained. Sometimes they are five ft. in length, and as smooth and straight as if turned. When of such a length, they command high prices. In Hungary, pipe-sticks made from the stems of the

Mock Orange (*Philadelphus coronarius*) are much used; and the jessamine sticks of Turkey are in great esteem in all countries. Orange and lemon trees and ebony also are used. The chief recommendation of these materials seems to be in the power of the wood to absorb the oil produced in smoking tobacco, and consequently to render the smoke less acrid: see TOBACCO-PIPES.

PIPETTE, n. *pī-pĕt'* [dim. of *pipe*]: in *chem.*, a small glass tube having a bulb in the middle.

PIPI, *pī'pī:* name given to the ripe pods of *Cæsalpinia Pipai* (see CÆSALPINIA), used in tanning, and frequently imported with Dividivi (q.v.), and sometimes separately, though they are very inferior to dividivi. Pipi, being straight, are easily distinguished from the pods of dividivi, which are curved.

PIP'ING CROW: see BARITAH.

PIPISTREL, n. *pĭ-pĭs'trĕl* [It. *pipistrello;* L. *vespertilio*, a bat—from *vesper*, the evening]: a species of bat, the smallest of the kind.

PIPIT, *pĭp'ĭt*, or TIT'LING, or TIT'LARK (*Anthus*): genus of birds included by Linnæus among Larks (family *Alaudidæ*), but now regarded as belonging to the sub-family *Anthinæ*, of the family *Motacillidæ* (Wagtails and Pipits); sub-order *Oscines*. The bill is more slender than in larks; the tips of the mandibles slightly bent downward and notched. The hind-claw is long, though not so long as in larks, and more or less curved. The plumage resembles that of larks; in habits and motion of the tail, there is greater resemblance to wagtails. The bill is not strong enough for feeding on grain or hard seeds, and insects and worms are the principal food of pipits. One species is the MEADOW P., COMMON TITLARK, or TITLING (*A. pratensis*), familiarly known in many parts of England and Scotland as the *Moss-cheeper* and occurring in Greenland, and, it is said, in Alaska. It is found in almost all parts of Europe, and in n. Asia, in w. India, in Japan, and in Iceland. It is a small bird, its color brown of various shades tinged with green; bill and feet mostly flesh-color. It frequent heaths, mosses, and pastures; and usually makes its nest on a grassy bank, or beside a tuft of grass or heath. Its song is weak and plaintive, and it generally sings in the air. It is gregarious in winter. The cuckoo is said to deposit its egg frequently in the nest of the Meadow P.—The common AMERICAN TITLARK (WAGTAIL, BROWN LARK, LOUISIANA PIPIT) is *A. ludovicianus;* bill blackish, feet brown; under-parts buffy, not greenish; found in all parts of N. America and in the Rocky Mts. above timber-line.—A rather larger species is the TREE P., or FIELD TITLING, which has a shorter claw, and perches on trees, frequenting inclosed and wooded districts; a summer visitant of Britain, and found in most parts of Europe, in Asia, and n. Africa.—The Rock P., or SEA TITLING (*A. petrosus*), a shore-bird, is rather larger than the Tree P., and has a long curved hind-claw: it feeds chiefly on small marine animals, seeking its food close to the edge of the retiring tide.

PIPKIN, n. *pĭp'kĭn* [a dim. of PIPE 1]: a cruet; a little pot; an earthen pot glazed on the inside, used in boiling.

PIP'PI, GIULIO: see GIULIO ROMANO.

PIPPIN, n. *pĭp'ĭn* [Dan. *pipling*, a small well-tasted apple: comp. F. *pepin*, so called probably because raised from the *pip* (q.v.) or seed]: name given to many varieties of apple, among which are some of the finest in cultivation, as the *Golden P.*, *Ribston P.*, etc.

PIQUA, *pĭk'wa:* city, Miami co., O.; on the Chicago St. Louis and Pittsburgh, and the Cincinnati Hamilton and Dayton railroads; on the Miami river, and the Miami and Erie canal; 28 m. n. by w. from Dayton, 73 m. w. by n. from Columbus. There are 13 churches; several schools; three daily and four weekly newspapers, one of the latter in German; two national banks, combined cap. $350,000, an opera-house, and some excellent hotels. Large iron-works have been established here, oil refineries are in active operation, and there are manufactures of furniture, mattresses, and various other articles. Water is furnished by the Holly system. The city is a distributing point for products of the surrounding agricultural region. The streets are wide and are lighted with gas and electricity. The river, which furnishes an excellent water power, is crossed by three bridges. Pop. (1880) 6,031; (1890) 9,090; (1900) 12,172; (1910) 13,388.

PIQUANT, a. *pē'kănt* [F. *piquant*, pricking, tart—from *piquer*, to prick]: pungent; sharp: tart; stimulating to the tongue; severe, as applied to language. PI'QUANTLY, ad. *-lĭ.* PIQUANCY, n. *pē'kăn-sĭ*, pungency; sharpness; severity.

PIQUE, n. *pēk* [F. *pique*, animosity—from *piquer*, to prick]: slight anger or resentment; wounded pride; offense taken; grudge; point; punctilio; term at a game of piquet: V. to displease, offend, or irritate; to touch with envy or jealousy; to pride or value one's self, as on an accomplishment or acquirement. PIQUING, imp. *pēk'ĭng.* PIQUED, pp. *pēkt.*—SYN. of 'pique, n.': offense; ill-will; displeasure; irritation; vexation; in *OE.*, nicety;—of 'pique, v.': to provoke; stimulate; sting; goad; nettle; fret; excite.

PIQUÉ, n. *pē-kā'* [F.]: a French material, strong and durable, woven with two cotton threads, one thicker than the other, usually having a lozenge-shaped pattern.

PIQUET, n. *pĭk'ĕt:* another spelling of PICKET, which see.

PIQUET, n. *pē-kĕt'* [F.: said to be from F. *pique*, as if a small contest or scuffle]: game of cards played between two persons with 32 cards—viz., the four honors, and the highest four plain cards of each suit. The cards are shuffled and cut as in whist, and then dealt, two by two, till each player has 12; and the remaining 8, called the *talon*, or stock, are then laid on the table. The first player must then discard from one to five of his cards, replacing them

with a similar number from the talon; and after him, the younger hand may discard if he pleases, similarly making up his proper number from the remaining cards of the talon. The player who first scores 100 wins the game, and the score is made up by reckoning in the following order—carte-blanche, the point, the sequence, the quatorze, the cards, and the capot. *Carte-blanche* is a hand of 12 plain cards, and counts 10 for the player who possesses it. The *point* is the greatest number of cards in any suit, or, if the players are equal in this respect, that which is highest in value (the ace counting 11, each court card 10, and the plain cards according to the number of pips), and counts a number equal to the number of cards in the suit. The *sequence* is a regular succession of three or more cards in one suit, and the highest sequence (i.e., the one containing the greatest number of cards, or if the players have sequences equal in this respect, the one of the two which begins with the highest card), if of three cards, counts 3; of four cards, 4; of five cards, 15; of six cards, 16, etc. The *quatorze* is a set of four equal cards (not lower than tens), as four aces, four queens, etc , and the highest quatorze counts 14 for its holder; but should neither player have a quatorze, then the highest set of three is counted instead, but it reckons only three. The possessor of the highest sequence or the highest quatorze also counts all inferior sequences and quatorzes (including sets of three); while his opponent's sequences and quatorzes go for nothing. The first player reckons his points, and plays a card; the dealer then reckons his points, and follows his opponent's lead, and cards are laid and tricks are taken as in any ordinary card-game. Each player counts one for every card he leads, and the taker of the trick (if second player) counts one for it; the possessor of the greater number of tricks counting 10 in addition (the 'cards'), or if he takes all the tricks, he counts 40 in addition (the 'capot'). If one player counts 30—i.e., 29 by his various points, and one for the card that he leads, before his adversary has counted anything, he at once doubles his score, reckoning 60 instead of 30 (this is called the 'pique'); and should his score reach 30 before he plays a card, or his adversary begins to count, he mounts at once to 90 (the 're-pique').

PIQUÉ WORK, *pē-kā' wėrk:* very fine kind of inlaying with gold, silver, and other costly materials; it is, in fact, a kind of Buhl-work (q.v.), done on a very minute scale. It is applied only to articles of small size, such as snuff-boxes, card-cases, and similar articles.

PI'RACY: robbery on the high seas; an offense against the law of nations. It is a crime not against any particular state, but against all mankind, and may be punished in the competent tribunal of any country where the offender may be found, or into which he may be carried, though committed on board a foreign vessel on the high seas. It is of the essence of piracy that the pirate has no commission from a sovereign state, or from one belligerent state at war with another. Pirates being the common enemies of all mankind, and all nations having an equal interest in their

apprehension and punishment, they may be lawfully captured on the high seas by the armed vessels of any particular state, and brought within its territorial jurisdiction for trial in its tribunals. The African slave-trade was not considered piracy by the law of nations; but the municipal laws of the British Kingdom and of the United States by statute declared it to be so; and since the treaty of 1841 with Great Britain, it is so declared also by Austria, Prussia, and Russia.

PIRÆUS, *pī-rē'ŭs* (Gr. *Peiraíeus*): principal harbor of both ancient and modern Athens (q.v.). Only a few traces remain of the long walls which formerly united it and Munychia with the capital city. The modern Piræus, which has sprung up since 1835, is a regularly laid-out town, with some good houses and shops, and a handsome stone exchange, built at the expense of the municipality. It was in 1869 connected with Athens by a railway, and it has several spinning factories of recent construction. The harbor, called also Porto Leone or Drakoni, is both safe and deep; but the entrance is narrow. Pop. 43,000.

PIRANO, *pē-râ'nō:* seaport of Austria, in the markgrafdom of Istria, on a peninsula in the bay of Largone, 15 m. s.w. of Trieste. It contains an old castle, has a port and several dockyards, commodious roads, in which large vessels find safe anchorage, and is the seat of considerable trade and commerce. Among its more important edifices are an interesting Gothic church, a town-house, and a Minorite convent, with a number of good pictures. Wine and oil are made in considerable quantities, and there are salt works in the neighborhood. Pop. 7,500.

PIRATE, n. *pī'rāt* [F. *pirate;* It. *pirato*—from L. *pirāta;* Gr. *peiratēs,* a sea-robber—from Gr. *peirāō,* I make an attempt]: one who lives by robbing ships at sea; an armed ship employed by pirates; figuratively, one who republishes the literary or artistic productions of another without leave: V. to take without right or permission, as the contents of books for republication; to counterfeit; to rob ships on the sea. PI'RATING, imp.: ADJ. republishing literary or artistic works without permission; counterfeiting. PIRATED, pp.: ADJ. taken by theft or without permission. PIRACY, n. *pī'rā-sĭ,* act or crime of a pirate; robbery of ships by open violence on the high seas (see below): the republishing the writings of other men without permission. PIRATICAL, a. *pī-răt'ĭ-kăl,* or PIRAT'IC, a. *-ik,* robbing or plundering on the high seas by open violence; applied to literary theft. PIRAT'ICALLY, ad. *-lĭ.*

PIRAYA, *pĭ-râ'ya,* or PIRAL, *pĭ-rī':* name in Guiana for *Serrasalmo piraya,* and other species of *Serrasalmo,* a genus of fishes of family *Characinidæ,* regarded by many as a section of *Salmonidæ* (q.v.). The fishes of this genus, of which numerous species inhabit the rivers and fresh waters of tropical S. America, have a compressed and deep

body, the belly keeled and serrated with a double row of hard serratures. They are extremely voracious, and not only consume with great rapidity dead carcasses thrown into the water, but attack living creatures much larger than themselves, biting off the fins of large fishes, and then devouring them at leisure, often mutilating ducks and geese by depriving them of their feet, and venturing to attack even oxen and human beings. The latter, however, make reprisals on them, and find them very good food. *Serrasalmo piraya* seldom exceeds 10 or 12 inches in length, but some of the species attain considerably larger size. Some are brilliantly colored. The Indians use the teeth for sharpening the arrows, made of the very hard ribs of palm-leaves, which they use for their blow-pipes, and which they sharpen to a very fine point by drawing them across a piraya's jaw, an article with which the Indian of Guiana is always provided; nor does the edge of the teeth soon begin to be worn. Pirayas are taken readily by a hook baited with almost any kind of bait; but they at once cut through any line, and the line must therefore be cased above the hook in tin-plate. The Indians often shoot them with arrows.

PIRMASENS, *pēr'mȧ-sĕnts:* town of the Bavarian Palatinate, formerly chief town of the county of Hanau-Lichtenberg, 22 m. w. of Landau. Its chief manufactures are shoes and musical instruments. Pop. (1900) 30,195.

PIRN, n. *pĕrn:* in *Scot.*, a quill or reed; a bobbin; a reel on which thread or yarn is wound; the reel of a fishing-rod.

PIRNA, *pēr'nȧ:* small town of Saxony, on the left bank of the Elbe, 11 m. by railway s.e. of Dresden. It is surmounted by a hill, crowned by a castle, now used as a lunatic asylum, contains a beautiful parish church, and a number of important benevolent institutions. Manufacture of stoneware employs many hands. Pop. (1895) 15,672.

PIROGUE, n. *pī-rōg'* [F. *pirogue*—from Sp. *pirag'ua*—originally a W. Indian word]: a kind of canoe consisting of the hollowed trunk of a single tree, used in the southern and eastern seas, in *N. Amer.*, a narrow ferry-boat.

PIROROCCO, n. *pĭr'ŏr-ŏk'kō* [Brazilian]: the term applied to the tidal bore of the Amazon.

PIROUETTE, n. *pĭr'ū-ĕt'* [the origin of *pirouette*, according to Littré, is unknown; Skeat's derivation from the Guernsey word *piroue*, a little wheel or whirligig, is very probable, *pirouette* being merely its diminutive: the word is of imitative origin]: in *dancing*, a whirling or turning about on the toes; the circumvolution of a horse on the same ground: V. to whirl round, while dancing, on the toes of one foot. PIR'OUET'TING, imp. PIR'OUET'TED, pp.

PISA.

PISA, *pē'zâ* or *pē'sâ:* one of the oldest and most beautiful cities of Italy, cap. of the province of P., which was part of the late grand duchy of Tuscany. P. is on the banks of the river Arno, which intersects the city and is spanned by three noble bridges; 43° 43′ n. lat., and 11° 24′ e. long. It has broad, straight, well-paved streets, and several fine squares. Among its 80 churches, the most notable is the cathedral, or Duomo, begun 1068, completed 1118, with its noble dome, supported by 74 pillars, and its fine paintings, variegated marbles, and painted windows. Near the cathedral stands the round marble belfry known as the Leaning Tower of Pisa, deviating about 14 ft. from the perpendicular. This celebrated building, 180 ft. in height, with seven stories divided by rows of columns, and surmounted by a flat roof and an open gallery commanding a splendid view of the surrounding country, was erected in the 12th c. by the German architect, Wilhelm of Innsbruck. The Baptistery, or Church of St. John, opposite the cathedral, an almost equally remarkable structure, was completed 1162 by Diotisalvi. The main building, circular, and raised on several steps, supports a leaden-roofed dome, having a second dome above it, surmounted by a statue of St. John: the beautifully proportioned interior, noted for its wonderful echo, contains a pulpit which ranks as the greatest masterpiece of Nicola Pisano, various pieces of sculpture, and a large octagonal marble font. The Campo-Santo, or ancient national cemetery, dates from 1228, when the Pisans caused earth to be brought from Jerusalem for the graves of the most distinguished citizens of the republic. In 1283 the ground was surrounded by cloisters, the walls of which were adorned by fresco-paintings, now nearly obliterated, though some of these works of art, which are chiefly by Giotto, Veneziano, Orcagni, and Memmi, still retain traces of their original beauty. Among the other public buildings of P., special notice is due to the churches of La Madonna della Spina and San Stefano, both rich in paintings and sculptures, and the latter famous for its organ, the largest in Italy; the grand ducal and Lanfranchi palaces; the Torre della Fame, so called from its being supposed to have been the spot in which Ugolino Gherardesca and his children were starved to death 1288; the university, founded 1330, and restored by Cosmo I. de' Medici, which had high reputation in the middle ages, and still is noticeable for its library, botanical garden, observatory, and affiliated schools and art collections, etc. In the neighborhood of P., at the foot of San Giuliano, are the mineral baths, whose fame, known to Pliny, continued through the middle ages to attract sufferers from every part of Italy. The waters, rich in carbonic acid and chloride of sodium, are efficacious in various arthritic and rheumatic affections.—Pop. of P., in the 13th c. 150,000, had fallen in the 19th c. to less than 25,000; but of late years trade and industrial arts have made rapid advance, and the pop. has increased. It now counts about 35,000 within the walls, and including the suburbs about 62,000.

THE LEANING TOWER OF PISA.

History.—Ancient P., like other Etruscan cities subject to Rome, retained its municipal govt. and had almost unlimited freedom while nominally under Roman protection; but on the decline of the imperial power it was compelled to submit in turn to the various transalpine nations who successively overran n. Italy. Early in the 11th c. P. had risen to the rank of a powerful republic, whose sway included the then fertile district known as the Maremma di Lerici, and which yielded little more than nominal homage to its suzerain lords, the emperors of Germany. Throughout the 11th c. P. was at the height of its prosperity, and to this period belong most of the splendid monuments of art that still adorn it. Its troops took part in all the great events of the Holy Land; and its fleet in turn gave aid to the pope in s. Italy, to the emperor in n. France, chastised the Moors, and exacted its own terms from the Eastern emperors. In their wars with the Saracens of Sardinia, the Pisans had conquered Sardinia, Corsica, and the Balearic Islands, and for a time maintained their ground against their hereditary enemies, the Genoese; but having sided with the Ghibellines in the long wars which desolated the empire, P. suffered severely at the hands of the victorious Guelphic party. Indeed, the rivalry of the Guelphic cities of Florence, Lucca, and Siena, brought P. to the brink of ruin at the close of the 13th c.; and after struggling more than a hundred years against external foes and the internal dissensions between the democratic mob and the Ghibelline nobles, without losing their character for indomitable valor, the Pisans finally threw themselves under the protection of Galeazzo Visconti of Milan. The son of the latter sold the Pisan territory to their greatest enemies, the Florentines, from whose tyrannical rule it was for a time relieved by Charles VIII. of France, who, 1494, accepted the protectorate of the city. When the French left Italy, the old struggle was renewed; and after a desperate resistance, the Pisans, 1509, were compelled by hunger to surrender to the Florentine army. The most influential families, as formerly in 1406, emigrated. P., with the rest of Tuscany, became part of the kingdom of Italy 1860. Since 1868 P. has given its name to an Italian province—pop. (1881) 283,269; (1890) 300,470; pop. of city (1892) 61,500; (1901) 61,321.

PI'SA, Council of: in 1409, one of the councils commonly reputed by Rom. Catholics as ecumenical or general, though some, especially of the Ultramontane (q.v.) school, do not rank it as such. It was assembled in the time of the great Western Schism, for restoring the peace of the church and the unity which had been interrupted by the rival claims of two competitors for the papacy. For the history of this rival claim, see Schism, Western. For our present purpose, it is enough to state that the adherents of both the claimants of the see of Rome—those of Gregory XII., as well as those of Benedict—agreed on the necessity of a general council as the only means of putting an end to the schism; and the rival popes having themselves either evaded or declined the demand, the car

dinals of both united in issuing letters of convocation, and in summoning both the claimants to the council so convened. Neither of them complied with the citation; but the council proceeded, nevertheless, to examine and deliberate on the case. It was opened at Pisa, 1409, Mar. 25; there being present 22 cardinals, 4 patriarchs, 12 archbishops, 80 bishops, together with representatives of 12 archbishops and 102 bishops, and a vast body of abbots, doctors in theology, and other eminent ecclesiastics. After formal citation of the rival popes to appear within a stated period, the council on the expiration of that period proceeded to declare them contumacious, and to examine their respective claims as though they had appeared. The result, after protracted inquiry, was a decree in the 13th session by which they both were declared schismatics, and their conduct heretical, and calculated to lead the people from the faith; wherefore, since they had violated the solemn engagements made at their respective elections, they were deposed from the papal dignity, and their followers released from obedience. In the 17th session, the cardinals having first pledged themselves by oath, each, that, if elected, he would continue the sittings of the council, entered into conclave to the number of 24, and unanimously elected Peter Philargi, one of the cardinal priests, and a member of the Franciscan order. He took the name Alexander V. The council proceeded after his election to pass a number of decrees, to give validity to the acts on either side during the schism. A vain attempt was made to obtain the submission of the still recusant rivals, and it was resolved that a new council should be held within three years. The authority of this council, like that of the Council of Constance, is alleged, on the Gallican side, as establishing the superiority of a general council over the pope. But the Ultramontanes reply that both these councils, also that of Basel, must be regarded as abnormal assemblies, called to meet the special emergency of a disputed succession and of a doubtful pope, and that these principles cannot by any means be applied to the ordinary circumstances of the church, or form a precedent by which to estimate the normal relations between a pope whose title is certain and undisputed, and a general council regularly assembled at a time of peace, and in the ordinary circumstances of the church. It cannot be doubted, nevertheless, that the spirit of the fathers at Pisa was the same which pervaded the succeeding assemblies at Constance and Basel, and found its permanent representation in the Gallicanism (see GALLICAN CHURCH) of later centuries.

PISANO, *pe-zâ'no*, ANDREA (ANDREA DA PONTADERA): sculptor: about 1270-1348. He began to study with Giovanni about 1300; and become the ablest of his pupils. He was called to Florence to execute in marble the statues, bas-reliefs, etc., designed by Giotto in ornamenting the cathredral of S. Maria del Fiore, then in course of erection. P.'s later style is attributed to Giotto rather than to his first master. He soon gained high position and important employment. He executed numerous statues for the façade

of the cathedral, and a bronze gate for the baptistery, of great excellence. This gate remains, together with the later and more celebrated gates of Ghiberti. Under the influence of Gictto's genius, he became Giottesque in thought and style ; and his works bear so distinctly the impress of that master-mind, that the design of many of them and particularly the baptistery gate, are ascribed to Giotto, See Vasari; *Christian Art*, by Lord Lindsay; Agincourt, *Davia Memorie Istoriche;* Rosini, *Storia, etc.;* Cicognara (tom. I.), *Monumenti Sepolcrali della Toscana.*

PISA'NO, NICCOLA: distinguished sculptor of Pisa, to the influence of whose works mainly the rise or restoration of sculpture in connection with Gothic architecture is attributable: about 1206–1278. There is no record of the date of his birth, but from an inscription on a celebrated fountain in Perugia, designed by him and executed by his son Giovanni, it is evident that he was born at the beginning of the 13th c. The place of his birth is variously stated as Siena (quite doubtful), and Apulia in s. Italy, or an Apulia (Tuscan) near Lucca. His earliest work is supposed to be the *Deposition* over one of the doors of the façade of the cathedral at Lucca, 1233. He worked on the principle of studying nature, modified or corrected by the ideal of antique sculpture; and it is said that he adopted this principle from the sculpture on an ancient sarcophagus brought from Greece in the ships of Pisa; but though most of the finest specimens of Greek sculpture were not discovered till long after P.'s time, he must have had opportunity of studying many important remains on the various classic ruins with which Italy abounds. This sculptor's reputation is supported by three important works, still admired—the pulpit of the baptistery at Pisa, the 'Arca' or shrine of St. Dominic for the church of that saint at Bologna, and the pulpit of the cathedral at Siena. The first, finished 1260, is reckoned the most elegant pulpit in Italy: it is of white marble, six-sided, supported by seven Corinthian columns, and adorned with five bas-reliefs of subjects from the New Test. The second work, the 'Arca' of St. Dominic, is of greater extent: it is composed of six large bas-reliefs, delineating the six principal events in the legend of St Dominic, and is ornamented with statues of our Savior, the Virgin, and the four doctors of the church. The operculum or lid was added about 200 years afterward. The subjects on the pulpit at Siena, the third of these works, are the same as those on that at Pisa, with the substitution of the *Flight into Egypt* and the *Massacre of the Innocents* for the *Presentation ;* and the enlargement of the concluding composition, the *Last Judgment.* In these compositions there is great felicity of invention and grouping, truth of expression and grace in attitudes and draperies ; and in that of the *Last Judgment* the boldness displayed in the naked figures, twisted and contorted into every imaginable attitude, is wonderful, and evinces the skill with which P. drew on the antique and on nature. But it must be admitted that there is a degree of confusion or overfulness in the grouping, and that the heads of his figures are often large in proportion to the bodies.

faults incidental to all early efforts. In this last work it appears by the contract for its execution, that P. was assisted by his scholars Lapo and Arnolfo, and his son Giovanni; and this accounts for a certain feebleness in portions of it. He died at Pisa, and was buried in the Campo Santo. P.'s influence on art extended widely; his pupils Arnolfo and Lapo executed numerous works at Rome, Siena, and other cities.—His son and heir in reputation, though not quite his equal in talent, GIOVANNI (about 1250–1330), was constantly engaged on works of importance; in Pisa, where the Campo Santo (for he was also an architect) was erected from his designs; in Naples, which he visited on the invitation of Charles I. of Anjou; at Arezzo, where he executed the marble shrine of St. Donato for the cathedral; at Orvieto, the bas-reliefs on the *facerata* of the Duomo, by many ascribed to P., being by him; at Pistoja, where he executed the pulpit, etc. After his death, probably about 1320, the Pisan school split into two principal branches, Florence and Siena; that of Naples also may be reckoned a branch, from the influence exercised over it by Giovanni.

PISCARY, n. *pĭs'kă-rĭ* [L. *piscārĭus*, relating to fishes; *piscātor*, a fisher—from L. *piscis*, a fish]: the privilege of fishing in the waters belonging to another. PISCATORIAL, a. *pĭs'kă-tō'rĭ-ăl*, or PIS'CATORY, a. *-tér-ĭ*, pertaining to fishes or fishing. PISCES, *pĭs'sēz*, the plu. of PISCIS, *pĭs'sĭs*, a fish [L. fishes]: in *astron.*, the twelfth sign of the zodiac, figured as two fishes. PIS'CINAL, a. *-sĭ-năl*, of or belonging to a fish-pond. PIS'CINE, a. *-sĭn*, pertaining to fishes. PIS'CICUL'TURE, n. *-sĭ-kŭl'tūr* or *-chûr* [L. *cultūra*, culture]: artificial method of propagating fish (see below). PIS'CICUL'TURAL, a. *-tū-răl*, pertaining to the artificial breeding and rearing of fish. PIS'CIFORM a. *-fawrm* [L. *forma*, shape]: having the form of a fish; resembling a fish. PISCIVOROUS, a. *pĭs-sĭv'ō-rŭs* [L. *voro*, I devour]: fish-eating.

PISCATAQUA, *pĭs-kăt'a-kwa:* river about 80 m. in length, the s. part of the boundary between Maine and New Hampshire, and forming at its mouth in the Atlantic the excellent harbor of Portsmouth.

PISCICULTURE, *pĭs'sĭ-kŭl'tūr.* Pisciculture, or fish culture, is the science by means of which men aid in increasing the number or improving the breeds of the various kinds of fishes and shell fishes that are most valued because of their food properties. To accomplish this purpose almost every civilized country now maintains a system of marine biological work, in which men devote all their energies to the investigation of the habits and the needs of fishes, that they may discover better methods of continuing the race, improving the breed, or adding to the usefulness of the individual fish.

According to the oldest and best authorities it was the Chinese who first interested themselves in fish culture, although it is known that the ancient Egyptians also devoted considerable time to this occupation. In the Roman republic pisciculture was regarded as a most important pursuit, and was conducted so successfully that, as Belonius said, the waters of the Propontis were more profitable for the fishes they produced than a similar extent of the best lands could have been if devoted to pasturage and harvest. Lucullus, who loved fish chiefly for its food value, dug large canals from his fish ponds to the sea, that the salt fish that spawn in fresh water might have a safe haven in which to lay their eggs.

Many different persons in almost as many different countries have sought to claim the credit of the discovery of the artificial fecundation of fish ova. So far as historical record is concerned, however, the first person who is known to have practised this branch of the piscicultural science was a monk named Dom Pinchon, who succeeded in breeding and raising fishes in wooden boxes supplied with running water, as early as the 15th century.

From that time, therefore, until nearly the middle of the 19th century, pisciculture was largely a private pursuit. In 1758, Stephan Ludwig Jacobi, who lived in Westphalia, made so many important discoveries along these lines that he was not only highly honored by the German government, but even the British government granted him a pension.

The credit of first turning the science of fish culture into practical channels, however, belongs to the French government, under whose auspices operations and experiments in pisciculture were commenced in 1842. These were so successful that, six years later, the establishment at Huningue, near the Rhine and the Rhone canal, commenced the work that has resulted in the restocking of the rivers and lakes of the country which had already become extremely deficient in their number and breeds of fishes.

PISCICULTURE.

Although Great Britain was one of the first of the European governments to appreciate the importance of Jacobi's discoveries, it was not until many years after the middle of the 19th century that official support was given to this work in England. It was about the same time that Germany, Italy, and Greece commenced to recognize the importance of this science in improving the supply of food fishes, although, in Norway, pisciculture had then received government recognition for more than ten years. In Japan the subject of fish culture had interested the individual scientist for many generations, but it was not until 1877 that it was reduced to a practical basis and placed under government control.

The first fish commission in the United States was appointed by the government in 1871, its duty being to investigate the cause of the diminution of food fishes along the sea coast and in the lakes. In 1872, a further duty, that of the propagation and multiplication of the food fishes, was detailed to the commission and since that time its work has progressed in a most marvellous manner, until to-day it is being conducted by a well-established bureau, under the control of the United States Department of Commerce and Labor. In addition to the effort of the national government, a large proportion of the various states have instituted state commissions for the purpose of protecting and improving their local waters, and as each of these commissions cooperate with the United States bureau, the laws necessary for the accomplishment of this common end have, in most cases, been passed by the several legislatures and are now being enforced under the direction of special officers appointed for that purpose.

The active field work of the United States Commission of Fisheries embraces practically the entire year, for the hatching of shad continues from March until August; of California salmon, from June to November; of Penobscot salmon, from June until March or April; of land-locked salmon, from September to March, and of whitefish, from October until March. Besides these species the Bureau is also engaged in cultivating and distributing catfish, suckers, buffalo-fish, minnows, herring, trout, graylings, cod, carp, pike and pickerels, perch, bass, sunfish, crappies, flounders, and, among crustaceans, the lobster.

Fishes are distributed at various stages of development, according to the species, the numbers in the hatcheries, and the facilities for rearing. Thus, such commercial fishes as the shad, whitefish, lake trout, cod, pike, perch, etc., are hatched in lots numbering many millions, and are, therefore, planted as fry, it being customary to distribute them just before the umbilical sac is completely absorbed. Atlantic salmon, land-locked salmon, and various species of trout are sometimes distributed as fry, but more frequently as fingerlings from 1 to 6 inches in length. The basses and sunfishes raised

at regular fish cultural stations are distributed from the time when the young rise from the spawning beds until they are from 3 to 5 inches in length, while the several kinds of fishes collected in overflowed lands—bass, crappie, sunfish, pike, pickerel, catfish, yellow perch, buffalo-fish, etc.—are from 2 to 6 inches in length when distributed.

Some idea of the immense production of the Bureau may be gathered from the fact that, during 1906, it distributed no less than 397,556,725 eggs; 1,526,681,638 fry, and 7,596,246 fingerlings, yearlings and adults. This classification of fish is made in accordance with the table of measurements adopted by the American Fisheries Society in July, 1905, and which has since been accepted in all fish-culture work. This provides the following uniform definitions:

Fry.—A fish up to the time the yolk sac is absorbed and feeding begins.

Advanced Fry.—A fish from the end of the fry period until it has reached a length of 1 inch.

Fingerlings.—Fish between the length of 1 inch and the yearling stage, the sizes being designated as follows: No. 1, 1 to 2 inches in length; No. 2, 2 to 3 inches in length; No. 3, 3 to 4 inches in length, etc.

Yearlings.—Fish that are one but not 2 years old. They are designated as No. 1, No. 2, etc., as in the case of fingerlings.

Although the number of fish and eggs produced by the Bureau of Fisheries in 1906 was 172,359,570 more than the output for 1905, and the latter was no less than 250,000,000 greater than that of any previous year, the production was not sufficient to meet the demands upon the Bureau. For several years the applications have been steadily increasing in number, the 5,806 received during 1906 being 898 more than were made in 1905. These were received from the various states that are engaged in restocking their waters, as well as from private individuals, for use in ponds, streams, and other fishing preserves. Wherever possible these applications are granted, the eggs or fry being delivered free of charge to the applicant at the railroad station nearest the point of deposit. Eggs, however, are delivered only to state hatcheries, or to applicants known to have good hatching facilities.

In addition to a regular fleet of steamers and launches, all of which are used in the Bureau's work in the various waters in and around the United States, six special cars are constantly employed in distributing its products to all parts of the country. These cars, which are operated by permanent crews, are equipped with all the apparatus necessary for the safe carriage of eggs, or young, or adult fishes, and there is no year in which they do not travel fully 100,000 miles, while the detached messengers who are assigned to see that shipments reach their destination in safety, travel no less than 300,000 miles in a year.

PISCICULTURE.

The work of the Bureau in increasing the fish supply now extends to every state and territory, and a perfectly friendly system of mutual cooperation exists between the Federal and the state authorities. The value of this policy has been shown by its success in preventing the injury of local fisheries by the introduction of non-indigenous fish. Thus, if the government were acting alone it might sometimes grant requests for the introduction of predaceous, or destructive fishes, for the stocking of waters in which other valuable, but still weaker species already existed. One instance of this was shown in the effort of residents of the Pacific states to introduce black bass both into trout streams and lakes. and into waters tributary to salmon streams. By referring this matter to the state fishery officials, this grave error was avoided.

Another extremely important branch of the Bureau's work is the acclimatization of fish. Thus, through its efforts, certain fishes that have confined their habitation to the eastern seaboard have been taken into western waters, while fishes from the Pacific coast have been introduced into the waters of the Atlantic. As the result of these efforts, both shad and striped bass, which were once exclusive to the Atlantic coast, have increased so abundantly that the aggregate sale of these two species in a single year has been in excess of 27,000,000 pounds, with a value of more than $950,000 at the prices actually paid to fishermen.

The introduction of the chinook salmon on the Atlantic coast, however, has not been so successful, but experiments are now being made in the introduction of other west-coast salmons, notably the silver salmon, and the humpback salmon. The steelhead trout, introduced from the western coast states into Lake Superior, has become so firmly established that it has already commenced to figure commercially, while the bluefin whitefish, introduced from Lake Michigan into Lake Superior, has become so abundant that millions of pounds of this species is being caught and sold by fishermen every year. The eastern brook trout has also been introduced into Colorado where it has increased so rapidly that it now exists there in greater numbers than in any other part of the country.

In addition to the Commission's work among the fishes it has also devoted a great deal of attention to the American lobster, the oyster, the clam, terrapin, and even to the sponge. If the rapid disappearance of the lobster be checked, it will be due to the efforts of this Bureau. It is largely due to its influence, too, that widespread attention is now being given to the cultivation of the oyster as well as to its protection by special legislation. Strenuous efforts have also been made to introduce the oyster along the coast of Maine, and the mollusk has been transplanted in California waters so successfully that the digging of the eastern oyster has

attained a position of great commercial importance. Some very valuable experiments in fattening the oyster have been made at Lynnhaven, Va., and the condition of the Gulf oyster has been materially improved by the Commission.

A great deal of time is also being devoted to the study of the clam, and especially of the quahog, or hard clam, which is now so extensively used in canning, and experiments in the planting and cultivation of this valuable mollusk have become one of the important branches of the Bureau's work.

The Commission is also engaged in an investigation of the diamond-back terrapin in view to devising some method by which the terrapin may be hatched and reared for market in greater numbers. To facilitate this work an experiment pound has been established on the eastern shore of Chesapeake Bay, in Maryland, and as the practicability of impounding terrapin has already been established it is not improbable that great improvements in the method of raising them will eventually be suggested.

The experiments in the raising of sponges from cuttings have been conducted at several points on the coast of Florida, and the results of the investigations show conclusively that sponges of marketable size may be grown in this manner, specimens more than 6 inches in diameter having developed from plants of three years growth. According to the report of the Commissioner of Fisheries: 'The sponges artificially grown are of excellent shape and quality, and are superior in both of these respects to sponges grown naturally in the same localities. The economic aspects of the experiments, however, are still to be demonstrated, as a search for a suitable material for support of the cuttings until they reach commercial maturity is yet unrewarded.' See FISH; ICHTHYOLOGY.

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PISCINA, n. *pĭs-sī'nă* [It. *piscina*, a pool or pond: L. *piscīna*, a fish-pond—from *piscis*, a fish], in the Roman *thermæ* (warm baths), the large basin or *pond* of tepid water in which the bather might swim.—In the Rom. Cath. Chh., shallow stone basin usually in the form of a canopied niche, with a drain (usually leading directly to the earth), in which the priest washes his hands, and for rinsing the chalice at the celebration of the mass. It is often placed on the south side of the choir.

PISÉ, *pe-zā':* kind of work used instead of brick, etc., for the walls of cottages: it consists of loam or earth hard rammed into framing, which when dry forms a wall.

PISE, *pēz*, CHARLES CONSTANTINE, D.D.: 1802–1866, May 26: b. Annapolis, Md.; Rom. Cath. clergyman and author He graduated at Georgetown Coll., D. C., and studied theology at Mt. St. Mary's Seminary, Emmittsburg, Md., at the same time acting as prof. of rhetoric and poetry He was ordained priest 1825, and was for some years engaged in pastoral work in Baltimore. He then went to Rome and continued his theological studies, and received the degree of S.T.D: in recognition of his services as a writer, he was made chevalier of the Holy Roman Empire. Returning to the United States, he was assigned by his bishop to duty at Washington. At the instance of Henry Clay, P. was chosen chaplain of the U. S. senate. He next did missionary work in New York and Brooklyn till his death. His writings consist of stories, poems, histories and biographies. His most considerable work was a *History of the Church* (5 vols., 1830).

PISEK, *pē'sĕk* (Boh. *Piscek*, sand): small town of Bohemia, on the right bank of the Wottawa, affluent of the Moldau; on a sandy plain (whence probably its name), 55 m. s.s.w. of Prague. The town is old, and contains the remains of a royal castle. Among other institutions are a school of arts and a high school. The manufactures are woolen and cotton fabrics, iron wire, and musical instruments. Pop. 10,545.

PISGAH, *pĭz'ga:* mountain range in Palestine, near Jericho; by some supposed to be also the name of the peak from which Moses viewed the Promised Land, and the place of his death. According to Prof. John A. Paine, who, 1873, made a careful investigation under the auspices of the Amer. Palestine Exploration Soc., P. is the mountain now known as Jebel Siâghah, in the Abarim range, about 4,500 ft. high and commanding a beautiful view of the surrounding region. This peak had been previously identified by the Duc de Luynes, but the results of his work were not published till those of Prof. Paine's research had been made known. The highest peak of the range is Nebo.

PISH, int. *pĭsh* [It. *pispissare*, to hush, to whisper very low; of imitative origin]: an interjection of contempt, equivalent to 'hold your tongue.'

PISH'AMIN: see DATE PLUM.

PISIDIA, *pĭ-sĭd'ĭ-â:* ancient district of Asia Minor, with Phrygia on the n. and Pamphylia on the s.; now belonging to Turkey. The Taurus Mountains, which pass through the territory, were formerly inhabited by a warlike people whom even the Romans could not wholly subdue. Constantine made it a separate province. Among its products were olives, salt, and an excellent quality of wine. The apostle Paul, in his missionary work, made at least two visits to this region.

PISIFORM, a. *pī'sĭ-fawrm* [L. *pīsum;* Gr. *pīson*, a pea: L. *forma*, shape]: pea-shaped; in *geol.*, occurring in small concretions like peas, as *pisiform iron-ore.* PISOLITE, n. *pī'sō-līt* [Gr. *lithos*, a stone]: a variety of limestone or carbonate of lime, found in globules like peas; still smaller ones are called *roestones* or *oolites.* PI'SOLIT'IC, a. *-lĭt'ĭk*, pertaining to pisolites.

PISIS'TRATUS: see PEISISTRATOS.

PISMIRE, n. *pĭz'mīr* [Eng. *piss*, urine, and OE. *mire*, an ant—from the sharp *urine* smell of an ant-hill: Dan. *myre;* Icel. *maurr*, an ant: comp. Gr. *murmēx;* L. *formica*]: the old name of the ant.

PISOLITE, *pī'sō-līt* [Gr. pea-stone]: concretionary limestone, differing from oolite in the particles being as large as peas.

PISS, n. *pĭs* [Dut. *pis;* Ger. *pisse*, urine: F. *pisser*, to pass urine: an imitative word]: urine: V. to make water; to discharge urine. PISS'ING, imp. PISSED, pp. *pĭst.*

PISSASPHALT, n. *pĭs'ăs-fălt* [Gr. *pissa*, pitch; *asphal'tos*, asphalt]: mineral pitch; the anc. Greeks gave the name *pissasphal'tos* both to the liquid and solid bitumen.

PISSOPHANE, n. *pĭs'sō-fān* [Gr. *pissa*, pitch; *phainomai*, I seem]: a mineral resembling pitch, of an olive-green or liver-brown color, having a vitreous lustre.

PISTACHIO, n. *pĭs-tā'shĭ-ō*, or PISTA'CIA, n. *-shĭ-ă* [F. *pistache;* It. *pistacchio;* L. *pistacĭum;* Gr. *pistakē;* Pers. *pistá*, the pistachio-nut]: genus of trees of nat. order *Anacardiaceæ*, having diœcious flowers without petals, and a dry drupe with a bony stone.—The PISTACIA or PISTACHIO TREE (*P. vera*) is a small tree about 20 ft. high, native of Persia and Syria, but now cultivated in all parts of s. Europe and n. Africa, and in many places naturalized. It has pinnate leaves, with about two pair of ovate leaflets, and an odd one; flowers in racemes; fruit ovate about the size of an olive. The stone or nut splits into two valves when ripe; the kernel, of bright green color, is very oleaginous, of delicate flavor, and with properties much resembling the sweet almond. In s. Europe and in the East, *Pistachio-nuts* are much esteemed; but as they readily become rancid, they are little exported. They are called sometimes *Green Almonds.* Oil is expressed from them for culinary and other uses. In cultivation, one male tree is allowed to five or six fertile ones. The tree is apt to be destroyed by a severe frost.—The MASTIC TREE, or LENTISK (*P. lentiscus*), yields the gum-resin called Mastic (q. v.): it is native of the countries around the Mediterranean.—The TURPENTINE TREE (*P. terebinthus*) yields the Turpentine (q. v.) known in commerce as *Cyprus Turpentine, Chian Turpentine,* or *Scio Turpentine,* which is of consistency somewhat like that of honey, greenish-yellow color, agreeable odor, and mild taste, and in its properties resembles the turpentine of the Coniferæ, but is free from acridity. It is obtained by making incisions in the trees, and placing

stones for the turpentine to flow upon, from which it is scraped in the morning, before it is liquefied again by the heat of the sun. The tree is about 30 or 35 ft. in height; and has pinnate leaves, of about three pair of leaflets and an odd one; the flowers in compound racemes, the fruit nearly globular: the kernel of the fruit is oleaginous and pleasant.—The BATOUM TREE (*P. Atlantica*), round-headed tree of about 40 ft. in height, native of n. Africa, produces a fruit much used by the Arabs; and a gum-resin of pleasant aromatic smell and agreeable taste, which exudes from its stem and branches, is chewed to clean the teeth and impart a pleasant smell to the breath.—The fragrant oil of the kernels of *P. oleosa*, native of Cochin China, is used by the people of that country to impart a perfume to ointments.

PISTACITE, n. *pĭs'tă-sīt* [from its *pistachio*-green color]: variety of epidote occurring in prismatic crystals, also granular, earthy, and in crusts; lime and iron epidote.

PISTIL, n. *pĭs'tĭl* [F. *pistil*—from It. *pistillo*, a pistil; L. *pistil'lum*, a pestle—from *pinsĕre*, to pound, to crush]: in *bot.*, the seed-bearing organ, occupying the centre of a flower, consisting of an upper part or *stigma*, a central part or *style*, and a lower or *ovarium*, containing the young seeds called *ovules*. PIS'TILLA'CEOUS, a. *-lā'shŭs*, growing on the pistil. PIS'TILLARY, a. *-tĭl-lĕr-ĭ*, connected with or pert. to a pistil. PIS'TILLATE, a. *-tĭl-lāt*, having a pistil—applied to a female flower or plant. PIS'TILLIF'EROUS, a. *-lĭf ĕr-ŭs* [L. *fero*, I bear]: having a pistil without stamens, as a female flower; same as pistillate. PIS'TILLID'IUM, n. *-lĭd'ĭ-ŭm* [Eng. *pistil*, and Gr. *eidos*, resemblance]: in *bot.*, an organ in the higher cryptogams (see below).—*Pistil*, in botany, is the female organ of fructification in phanerogamous plants; that part of the Flower (q.v.) which, after flowering is over, is developed into the fruit. There is sometimes one P. in a flower, sometimes more; in some flowers, which have numerous pistils, they form a number of whorls, one within another, sometimes on an elevated receptacle or elongated axis, or, more rarely, they are spirally arranged. In every case the centre of the flower is occupied by the pistil or pistils, if present: see FLOWER. P. is formed either of a single Carpel (q.v.), as is the case when there are numerous pistils, or of several carpels combined; and the number of carpels of which the P. is formed is often indicated by the number of the cells of the germen, or by its lobes or angles. The P. usually consists of a Germen (q.v.) or ovary, in which the Ovules (q.v.) are contained, and which is surmounted by a *stigma*, either immediately or through the intervention of a *style;* but in Gymnogens (q.v.), there is neither germen, style, nor stigma, the female organs of fructification being mere naked ovules. The germen is always the lowest part of the pistil. The stigma exhibits an endless variety of forms, and is adapted to the reception and retention of the pollen grains requisite for fecundation, partly by the roughness of its surface—which is of somewhat lax cellular tissue, covered with projecting cells, often in the form of minute warts, and often

elongated into hairs—and partly by secretion of a viscous fluid. The stigma when not *sessile*—or seated immediately on the germen—is supported by the style, which rises from the germen, and on whose top the stigma is generally placed. The style is sometimes very long and slender, sometimes very short; the germen sometimes passes imperceptibly into the style, and sometimes the style rises from it abruptly; and similar differences appear in the relations of the style and stigma; the stigma, however, may be regarded as always an expansion of the top of the style, though it is sometimes, but rarely, situated on one or both sides of the style, beneath its summit. In like manner, by peculiar modifications taking place in the growth of the germen, the style sometimes seems to arise from beneath its apex, or even from its base; but it always rises from

Pistils:

1, Section of flower of a species of Primrose, showing the pistil laid open; numerous ovules attached to a free central placenta. 2, Section of flower of Comfrey, with corolla removed, showing two of the four ovaries, and the style. 3, Pistil of the Barberry, consisting of several carpels combined; the style very short and thick, the stigma shield-like. 4, Section of the ovary of a Lily. 5, Section of flower of Cherry, showing pistil of two separate carpels, only one of which comes to perfection in fruit. 6, Pistil of Pea, opened; *a*, ovule; *b*, placenta; *f*, umbilical cord.—From Balfour's *Class-book of Botany*.

what is, structurally considered, the real apex of the germen. When several carpels are united to form one germen, they are sometimes again separated in their styles, and more frequently in their stigmas, so that one germen bears several styles, or the style divides at some point above the germen, or one style is crowned by a number of stigmas. The style is usually cylindrical; and when this is not the case, it is often due to the combination of

several styles into one, though sometimes the style is flat and even petal-like. It is traversed throughout its length by a canal, which, however, is in general partly filled by cells projecting from its sides, and often also by very slender tubes extending in the direction of its length; the function of the canal, to which the inclosed slender tubes are in some way subservient, being to bring about the connection between the pollen and the ovules for Fecundation (q.v.). The length of the style is adapted to the ready fecundation of the ovules, being such that the pollen may most easily reach the stigma; and in erect flowers, the styles are usually shorter than the stamens; in drooping flowers, they are larger than the stamens. After flowering is over, when fecundation has taken place, the *foramen* of the ovules closes, the germen enlarges and ripens into the fruit, while each ovule is developed into a seed. The style and stigma meanwhile either fall off, or remain and dry up, or they increase in size, and are changed into various kinds of appendages of the fruit, as feathery awns, beaks, etc.

PISTILLIDIUM, *pĭs-tĭl-lĭd′ĭ-ŭm*, in Botany: term designating the organ that serves as ovary in some of the higher flowerless plants, such as ferns, though its product is spores (not seeds); these are fertilized by an organ, *Antheridium* (q.v.), of function similar to that of the pollen-producing anthers of flowering plants. The P., termed also *archegonium*, has its theoretic homologue in the corpusculum (necked ovum) of the Pine, the surrounding endosperm of which is thought to represent the fern prothallus. *Sporangium*, like the P., is a spore-case, but the word is now applied to the asexual spore-cases. The Pistillidia are very various in their forms and in the situations which they occupy in different orders and genera; being sometimes immersed in the substance of the plant, sometimes distinct from it, sometimes sessile, sometimes stalked, etc. See the titles of the higher flowerless orders.

PISTOJA, *pĭs-tō′yâ* (anc. *Pistorium*): manufacturing town of Italy, province of Florence, 21 m. by railway n.w. of the city of Florence; on a gentle rising ground at the foot of the Apennines. It is well built; its streets are thoroughly Tuscan, and it is surrounded by lofty and well-preserved walls. The chief buildings are the cathedral, built at various times, and containing a number of good pictures; several old and interesting palaces, and a number of churches, some of which are important in the history of mediæval architecture and sculpture. The principal manufactures are iron and steel wares, and paper. Pop. (1881) 20,190.

PISTOL, n. *pĭs′tŏl* [F. *pistolet;* It. *pistola*, a pistol—originally a small dagger made at *Pistola* (the modern *Pistoja*) in Italy]: a small hand-firearm: V. to shoot with a pistol. PIS′TOLLING, or PIS′TOLING, imp. PIS′TOLLED, or PIS′TOLED, pp. *-tŏld.* PISTOL-SHOT, within range of a pistol. PIS′TOLET, n. *-lĕt*, a little pistol.—The *Pistol* is the smallest description of firearm, and is intended to be used with one hand only. Pistols vary in size from the delicate

saloon-pistol, often less than six inches long, to the horse-pistol, which may measure 18 inches, sometimes 24 inches. They are carried in holsters at the saddle-bow, in the belt, or in the pocket. Every cavalry soldier should have pistols, for personal defense and for giving an alarm or signal. The latest improvement on the pistol is the Revolver (q.v.).

PISTOLE, n. *pĭs-tōl* [F.: connected in root with *pistol*]: name formerly of certain gold coins current in Spain, Italy, and parts of Germany. The pistole was used first in Spain, and was originally equivalent to about 11 old French livres, but till 1728 it was merely an irregular piece of gold. From this time till 1772, its value was about $4.15; but decreased after this date till it reached the value of 80 reals, or about $3.93. The Italian pistoles also were gold coins, and varied considerably in value: that of Rome = about $3.34; of Venice = about $3.94; of Florence and Parma = about $4.10; and the old coin of Piedmont = about $5.49; or 24 old liras. Gold coins of this name formerly were current in Hesse-Cassel, Switzerland, Brunswick, and Hamburg; but were in most cases merely convenient multiples of the ordinary thaler and gulden.

PISTON, n. *pĭs'tŏn* [F. and Sp. *piston;* It. *pistone,* a piston—from L. *pistus,* bruised or pounded; *pinso,* I pound]: the plunger in a pump or steam-engine; a strong short rod of wood or iron, solid or hollow, with a valve fitted at the bottom, made to fit exactly the barrel of a pump, or the cylinder of a steam-engine, and to work up and down in it. Piston-head, the solid or hollow disk-like plunger in the cylinder which is moved with a reciprocating or forward and backward movement by the action of the steam, thus converting the energy of the steam into the motion which drives the engine. Piston-packing, the packing by means of which the piston-rods are made steam tight. Piston Packing-rings, the rings of cast-iron, wrought-iron, steel, or gun-metal which form the peripheral portions of the piston-heads, and make a steam-tight joint between the piston-heads and the inside surface of the cylinders. They are made thin and turned slightly larger than the bore of the cylinders, and thicker on one side than on the other so as to act as a spring when they are slotted diagonally across and forced into the cylinders between the piston covers. After being placed in position, their elasticity tends to thrust them outwards and thus maintain a steam-tight joint with the bore of the cylinder. Piston-rod, the rod attached to the piston-head, and by means of which the motion of the piston-head is communicated to the connecting-rod or crank. It works through a packed stuffing-box which prevents the leakage of the contents of the cylinder. Piston-valve, a balanced slide valve of circular transverse section, which moves snugly in a circular seating, and opens and closes steam ports arranged diagonally around the seating.

PI'SUM: see PEA.

PIT, n. *pĭt* [AS. *pytt;* Gael. *pit*, a hole: F. *puits;* It. *pozzo*, a well: Dut. *put*, a well—from L. *putĕus*, a dug place]: a hollow or cavity, more or less deep, made by digging in the earth (see further, PIT, in Gardening): the shaft of a mine; a mark made by disease on the skin; any hollow or depression, as on the skin, under the arm, etc; the hollow of the body at the stomach; a snare for wild beasts, consisting of a deep concealed hole in the ground; the lowest and central part of a theatre; the area on which cocks fight; whatever entraps; the grave; the bottomless pit: V. to indent with little hollows; to place in a pit or hole; to set against in competition, as in a combat—a phrase taken from cock-fighting. PIT'TING, imp. PIT'TED, pp. PITMAN, a worker in a pit in coal-mining. COAL-PIT, a deep excavation among the earth's strata from which coals are extracted. PIT-COAL, coal from pits. PITFALL, a hole or pit slightly covered as a trap. TO HAVE THE POWER OF PIT AND GALLOWS, to have power of imprisonment and death. COCK-PIT: see under COCK 1. *Note.*—The *pit of a theatre*, according to Wedgwood, is probably from Sp. *pátio*, the central court of a house, thence the pit which occupies the same place in a theatre.

PIT, in Gardening: excavation in the ground, intended to be covered by a Frame (q.v.), for protection to tender plants in winter, or for forcing vegetables, fruits, etc. Pits are often walled on all sides, though, in many small gardens, excellent use is made of pits which are mere excavations. The walls are often raised above the ground, particularly the back wall, to give slope to the glazed frame. A pit in which no artificial heat is supplied is called a *cold pit;* but when forcing is intended, flued pits are often used. Artificial heat is sometimes given by means also of fermenting matter. The ventilation of pits, as much as the weather will permit, is indispensable.

PITA-HEMP, *pē'tâ-hĕmp:* one of the names of the Agave or Aloe fibre: see AGAVE.

PIT'AKA (literally, 'basket'): Buddhistic term for a division of their sacred literature, occurring especially in combination with *tri*, 'three;' *tripit'aka* meaning the three great divisions of their canonical works, the *Vinaya* (discipline), *Abhidharma* (metaphysics), and *Sûtra* (aphorisms in prose); and collectively, therefore, the whole Buddhistic code. The term 'basket' was applied to these divisions, because the palm-leaves on which these works were written were kept in baskets, which thus became a part of the professional utensils of a Bhikshu, or religious mendicant.

PIT-A-PAT, ad. *pĭt-ă-păt'* [imitative of a quick succession of light blows]: with a flutter, as the heart: N. palpitation; light, quick, oft-repeated sounds.

PITCAIRN, *pĭt'kärn,* JOHN: about 1740–1775, June 17; b. Scotland. In early life he entered the British army, and reached the rank of major 1771. In the troublous times preceding the revolution he was in command of the British forces at Boston, and was noted for his impartiality in treating disputes between his troops and the citizens. He commanded the advance force directed by Gen. Gage to gain possession of the bridges at Concord, ordered the dispersion of the militia whom he met at Lexington, and is said to have commenced the famous battle at that place by ordering his troops to fire on the rebels; but this was always stoutly denied by P., and is certainly open to doubt, as various accounts state that there had been considerable firing before the decisive command was given. He led the party which made the final assault at the battle of Bunker Hill, and received a fatal wound as he mounted the redoubt. The British govt. gave a pension of £200 to his widow.

PITCAIRN ISLAND, *pĭt-kärn':* solitary island in the Pacific Ocean, at the s.e. corner of the great Polynesian Archipelago; lat. 25° 3′ 6″ s., long. 130° 6′ w. Its length (2¼ m.) is about twice its breadth; area approximately 1¼ sq. m.; so that, except from its being the only station (except the Gambier Islands) between the S. American coast and Otaheite at which fresh water can be procured, it would be too insignificant for notice, except for the story of its colonization. The island is wholly surrounded by rocks; it has no harbor, and its soil is not very fertile. It was occupied 1790 by the mutineers of the *Bounty* (see BLIGH, WILLIAM), who, after touching at Toobouai, sailed for Tahiti, where they remained some time. Christian, leader of the mutineers, however, fearing pursuit, hastened their departure; and after leaving 16 sailors (of whom 14 were afterward captured, and 3 put to death 1792, Sep.) who preferred to stay on the island, they brought off with them 18 natives, and sailed eastward, reaching P. I., where they took up their residence, and burned the *Bounty.* They numbered then 9 British sailors and 6 Tahitian men, with 12 women. Concord was impossible in such a desperate band; and, in the next ten years, all the Tahitian men, all the sailors, except Alexander Smith (who subsequently changed his name to John Adams), and several of the women, had died by violence or disease. From the time of their leaving Tahiti, nothing had been heard of them, and their fate was known only when an American, Capt. Folger, touched at P. I. 1808, and on his return reported his discovery to the British govt.; but no action appears to have been taken by the latter. 1814, Sep. 17, a British vessel, the *Britain,* stopped at the island, and found old Adams still alive, commanding the respect and admiration of the whole little colony, by his exemplary conduct and fatherly care of them. Solitude and remembrance of early Christian instruction had wrought a powerful change in Adams; who had earnestly and successfully trained the children of his old companions in Christian faith and duty so that they had become as virtuous,

amiable, and religious a little community as was ever seen. They were visited by British vesssels 1825 and 30, and the reports concerning them were corroborative of the previous accounts; but, in 1831, their numbers (87) had become too great for the island, and at their own request they were transported to Tahiti by the British govt. But, disgusted at the immorality of their Tahitian friends and relatives, they chartered a vessel, defraying part of its cost with the old copper bolts of the *Bounty*, and most of them returned to P. I. at the end of nine months. In 1839, being visited by Capt. Elliot of the British govt. ship *Fly*, they besought to be taken under the protection of Britain, on account of annoyances by lawless crews of whale-ships; accordingly, Capt. Elliot took possession of P. I. in the name of the queen, gave them a Union Jack, and recognized their self-elected magistrate as the responsible governor. He also drew up for them a useful code of laws. From this time, they were frequently visited by European ships; and, 1855, finding their numbers again too great for the island, they petitioned govt. to grant them the much more productive Norfolk Island, to which they were accordingly removed 1856. In 1859, however, two families, numbering 17 persons, returned to P. I., reducing the number on Norfolk Island to 202; and others have since followed. From their frequent intercourse with Europeans, the Pitcairn Islanders, while retaining their virtuous simplicity of charaeter and cheerful hospitable disposition, have acquired the manners and polish of civilized life, with its education and taste. They are passionately fond of music and dancing, the latter evidently a legacy from their maternal ancestry. The men are engaged in whaling and herding cattle, or in cultivating their gardens and plantations; while the women (who seem the more industrious class) attend to their families, manage the dairies, and take occasional part in field-labor.

P. I. was discovered by Carteret 1767, and was named by him after one of his officers; but it was never visited by Europeans till taken possession of by the mutineers. When Admiral de Horsey visited P. I. 1877, there were in all 16 men, 19 women, 25 boys, and 30 girls on the island. Total pop. (1884) 130.

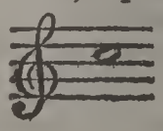
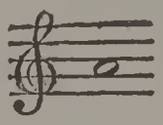
PITCH, n. *pĭch* [Ger. *pech;* Dut. *pik;* L. *pix;* Gr. *pitta*, pitch: W. *pyg*, pitch, rosin: connected in root with Gr. *peukē*, the fir; *pitus*, the pine]: the thick black substance obtained by boiling down common tar; the resinous juice of the pine or fir-tree. The common kind of pitch is the black residue which remains after distilling wood-tar: see TAR. It is made extensively in N. America, Norway, and Russia. As it protects wood from the action of water, it is used for calking the seams, and coating the outsides of ships and boats; it is also applied to the inside of water-casks, and has many similar uses. A variety of pitch is now obtained from distillation of coal-tar, and another from bone-tar; the latter is said to be nearly equal in value to that from wood, but coal-pitch lacks the toughness which is one of the more valuable qualities of wood-pitch. It is much used in mak-

ing artificial asphalt for building and paving purposes; and for the black varnish used for coating iron-work to keep it from rusting. Pitch is solid at the ordinary temperature of our climate, but softens and melts with small accession of heat. PITCH, v. to smear or cover with pitch; to blacken; to obscure. PITCH'ING, imp. PITCHED, pp. *pĭcht.* PITCHY, a. *pĭch'ĭ*, like pitch; smeared with pitch; dark; dismal. MINERAL PITCH, pine-resin. BURGUNDY PITCH, *bĕr'gŭn-dĭ*, white pine-resin (see BURGUNDY PITCH). PITCH-LIKE, dark in color; black. PITCH-BLACK, black as pitch. PITCH-COAL, a name for jet, referring to its pitch-like aspect. PITCH-DARK, very dark. PITCH'BLENDE, *-blĕnd*, a blackish ore of uranium and iron—called also PITCH-ORE, a preparation of which is employed in imparting to glass a pale, opalescent, sea-green color, and also employed in porcelain-painting. PITCH-PINE, one of the pines that abound in resinous matter. PITCH-STONE, a glassy rock of a pitch-like appearance, occurring in dikes and disrupted masses.

PITCH, n. *pĭch* [W. *picell*, a dart or arrow; *picio*, to dart; *picellu*, to throw a dart: It. *picco*, a peak, a sharp point: *pitch* is a weakened form of *pick*, which see]: any degree of elevation or slope; slope or declivity, as of a hill or roof; a fall or throw; a throw at a point; a casting forward or down; the degree of acuteness or graveness of a sound, generally musical (see below): degree; position; in *mech.*, the distance between centres, as between two adjacent teeth of gearing: V. to fling or throw; to plant or set, as a camp or tent; to throw, as at a point; to cast forward; to ascertain by trial the key-note of a piece of music; to rise and fall, as a boat or ship on the water; to come to rest after flight; to plunge or fall headlong. PITCH'ING, imp.: ADJ. descending or sloping, as a hill: N. act of throwing or casting; a setting or fixing; the alternate rising and falling of a ship's head and stern on the waves. PITCHED, pp. *pĭcht:* ADJ. fixed. PITCH'ER, n. *-ĕr*, he or that which pitches or tosses. PITCHED BATTLE, a battle in which the opposing forces have taken up a fixed position, thus distinguished from a skirmish. PITCHFORK, a farming instrument, pronged as a fork, for lifting and throwing hay or sheaves of grain; a small steel instrument, having two somewhat thin and broad prongs, which gives forth a fixed musical sound on the pressure and sudden release of the prongs (see PITCH, below). PITCH-PIPE, a small wind musical instrument employed to find the pitch or elevation of a tune. PITCH-WHEELS, toothed wheels which work together. TO PITCH ON OR UPON, to come suddenly down upon; to fix the choice upon.

PITCH, in Music: degree of acuteness or graveness of musical sounds. A musical sound is produced by a series of vibrations recurring on the ear at precisely equal intervals; the greater the number of vibrations in a given time, the more acute or higher is the P. In stringed instruments, the P. is dependent on the length, the thickness, and the degree of tension of the strings; the shorter and thinner a string is, and the greater its tension, the higher is the P. of the note. In wind instruments, where

the notes are produced by vibration of a column of air, as in the mouth-pipes of an organ, the P. is dependent on the length of the column set in motion; the shorter the column of air, the higher the P. becomes.

The P. of musical instruments is adjusted by means of a tuning-folk, consisting of two prongs springing out of a handle, so adjusted as to length that, when struck, a particular note is produced, that note being C.  in Britain, and A  in Germany. It is obviously important to have a recognized standard of pitch, by which instruments and voices are to be regulated; but there is, unfortunately, not the uniformity desirable in the P. in actual use. For a long time prior to 1859, concert-P. in Britain had been gradually rising, to the detriment of the voices of public singers. The C tuning-fork, in use 1699, made 489 vibrations per second; but in 1859 the number of vibrations had increased to 538. Hullah, 1842, in his numerous classes under governmental sanction, adopted 512, which has an especial convenience as being a power of 2. The French Imperial govt. 1858 fixed on 522. In 1859 a committee of the Soc. of Arts was appointed to consider the subject of a uniform musical P. Their deliberations lasted 12 months. Sir John Herschel, in a letter to the committee, strongly recommended the number 512. It was agreed on all hands that the then existing opera-pitch of 546 was too high and painful to the singers of soprano music. The instrumental performers stated that they could lower the P. to 528, but if they had to lower it to 512, some of them would have to purchase new instruments; and, in consequence apparently of their representation, the committee reported in favor of 528. In the U. S. the pitch for instruments has varied, with tendency on the whole to the higher European grades, against which singers have at times protested.

PITCHBLENDE, *pĭch'blĕnd*, or PITCH'-ORE: mineral, essentially oxide of Uranium (q.v.), with slight mixtures of other substances. Its color is grayish-black or brownish-black. It is infusible before the blow-pipe, without addition of borax, with which it fuses into a dull yellow glass. From P. is derived an orange pigment.

PITCHER, n. *pĭch'ẽr* [OF. *picher;* W. *piser;* It. *pecchero, bicchiere,* a drinking-glass: Gael. *pigeadh,* a pitcher]: an earthenware or tin vessel for holding water. PITCHER PLANT, a plant, a native of China and the East Indies, found growing in marshy situations, the leaves of which terminate in hollow vessels resembling water-pitchers, furnished with lids which open and shut, and which are found filled with pure water—various species of *Nepen'thēs* (q.v.), ord. *Nepenthācĕæ.*

PITCHER, *pĭch'ĕr*, Thomas Gamble: b. Rockport, Ind., 1824, Oct. 23; d. Fort Bayard, N. M., 1895, Oct. 21. He graduated from West Point 1845, participated in the principal battles in the Mexican war, served at various points in Texas, and reached the rank of captain 1858. He was made brigadier general of volunteers 1862; from 1863 till the close of the war was commissary and provost marshal, and was brevetted brigadier general U. S. A. 1865. He was commissioned colonel 1866, was superintendent of West Point 1866-71, governor of the Washington Soldiers' Home 1871-77, was retired 1878, and was superintendent of the N. Y. Soldiers' and Sailors' Home, 1880-87.

PITCH'STONE, *-stōn:* name sometimes given to a variety of common Opal (q.v.). brown, black, gray, red, or of mixed colors; the lustre more resinous than in opal and the fracture less perfectly conchoidal.—The same name is given to another mineral (Ger. *Pechstein*), variety of felspar (q.v.), occurring as a rock in dikes which traverse strata or in overlying masses; compact, slaty, or in concentric slaty concretions. It exhibits great variety of color, and has a somewhat resinous appearance. It often contains numerous imbedded crystals of felspar, and is then called *P. porphyry.*

PITCHURIM BEANS, *pĭch'ū-rĭm-bēnz*, or Sas'safras Nuts: occasional article of export from S. America; the seed-lobes of *Nectandra Puchury*, a tree of the same genus with the Greenheart (q.v.), growing on the banks of the Rio Negro and elsewhere in the rich, alluvial parts of the basin of the Amazon. They are about an inch and a half long, and half an inch broad. They are in demand among chocolate manufacturers for flavoring, as a substitute for vanilla. They are sometimes called Wild Nutmegs, because of a resemblance to nutmeg in flavor. The name Sassafras Nuts also is due to the flavor, which approaches that of Sassafras bark; and the tree belongs to the same nat. order with the Sassafras tree.

PITEOUS, a. *pĭt'ĕ-ŭs* [see Pity]: deserving or exciting compassion; sorrowful; mournful; in an *ill sense*, paltry; poor. Pit'eously, ad. *-lĭ.* Pit'eousness, n. *-nĕs*, state of being piteous.—Syn. of 'piteous': pitiful; pitiable; despicable; contemptible; sorrowful; mournful; affecting; doleful; woful; miserable; wretched; tender; compassionate.

PITH, n. *pĭth* [AS. *pidha;* Dut. *pit;* Low Ger. *peddik, picke*, pith, kernel]: the soft spongy substance in the centre of plants and trees (see below): the best of a thing; strength; force; closeness and vigor of thought and style; summary; applied to the spinal column of nervous matter: V. to remove the pith from. Pith'ing, imp. Pithed, pp. *pĭtht.* Pith'less, a. *-lĕs*, without pith; wanting in strength or energy. Pithy, a. *pĭth'ĭ*, abounding with pith; forcible; energetic. Pith'ily, ad.

-lĭ, with energy or vigor. PITH'INESS, n. *-nĕs*, the quality or state of being endowed with energy or vigor; concentrated force.—SYN. of 'pith, n.': strength; force; energy; cogency; weight; moment; quintessence; marrow.

PITH (*Medulla*): light cellular substance which occupies the center of the stem and branches in exogenous plants. In the earliest stage of a young stem or branch, it is composed entirely of cellular substance and bark; the vascular bundles or woody fibre appearing afterward, and in trees and shrubs, generally increasing, so as to constitute the greater part of the substance of the stem and branches, while the Pith is ultimately reduced to a very small column in the centre. The Pith, however, exists even in the most mature woody stem, and maintains its connection with the bark by means of *Medullary Rays*, analogous in their character to the Pith itself, and which exist even in the most compact wood, though much compressed by the woody layers, and in a tranverse section appearing as mere lines. The medullary rays convey to the central parts of the stem the secretions of the bark necessary for nourishment. Pith is in general composed entirely of cellular tissue; vessels occurring in it only in a few plants. Its cells diminish in size from the centre toward the circumference. In a few plants, it exhibits cavities in a regular arrangement; in many herbaceous plants of rank growth, large irregular cavities occur in it. The Pith is surrounded by a thin vascular layer, the *Medullary Sheath*, consisting chiefly of spiral vessels, which continue to exercise their functions during the life of the plant.

PITH'ECANTHRO'PUS ERECT'US: the name given by Dr. Eugene Dubois to the fossilized remains found by him in Java in 1891–2. These consist of the upper part of a cranium, a left femur, and two molar teeth, and indicate an animal midway between man and the higher apes, and of Pleistocene age. Much doubt and discussion was aroused at first in regard to it, but the weight of scientific opinion is now in agreement with the opinion of its discoverer. The animal when erect must have stood 5½ feet high, 'and the contents of the cranium,' says Beddard, 'must have been 1,000 cm., that is to say, 400 cm. more than the cranial capacity of any anthropoid ape, and quite as great or a trifle greater than the cranial capacity of some female Australians and Veddahs; but as these latter are not five feet in height, the ape-like man had really a less capacious cerebral cavity.' The skull in form and capacity stands roughly midway between that of a young chimpanzee (with no crest), and that of the lowest human example known—the man of Neanderthal. Consult the discoverer's monograph, *Pithecanthropus erectus* (Batavia, 1894, in German); reprinted in English in *Smithsonian Report* for 1898; Haeckel and Gadow, *The Last Link* (1898); and Beddard, *Mammalia* (1901).

PITHE'CIA. See SAKI.

PITHE'CUS. See ORANG.

PITHOM: according to Exodus I:II, one of the treasure or store cities built by the Israelites for Pharoah. Its site was discovered by E. Naville in 1883, as to the east of the Wady Tumilat, southeast of Ismailia, where formerly stood a group of granite statues representing Rameses II. between two gods. Under the auspices of the Egypt Exploration Fund, Naville brought to light a city wall, a ruined temple and the remains of a number of brick buildings with thick walls and consisting of rectangular apartments of different sizes, opening only at the top and not connected with each other; supposed to have been granaries or store-chambers for the army. This identification confirms the statement in the Pentateuch, and indicates Rameses II. as the oppressor of Israel. As the name of the city 'Pi-tam' is first found on Egyptian monuments of the nineteenth dynasty, the date of the Exodus must have been towards the end of that, or the beginning of the following dynasty. See Naville's *'The Store City of Pithom*, etc., in *Memoirs of Egypt Exploration Fund* (1885).

PIT'MAN, *pĭt'man*, BENN: American phonographer: b. Trowbridge, Wiltshire, 1822, July 24. He was educated in the academy of his brother, Sir Isaac Pitman (q.v.), and for ten years engaged in lecturing on and teaching phonography in England. In 1853 he came to this country and established the Phonographic Institute at Cincinnati, Ohio, of which he has since been president. He was military recorder of State trials during the Civil War, invented the electro-process of relief engraving, and in 1873-92 was lecturer on art and teacher of artistic wood-engraving in the Cincinnati Art Academy. He has published: *Manual of Phonography* (1854); *History of Shorthand* (1858); *A Plea for American Decorative Art* (1895; *Phonographic Dictionary* (1899); *Life of Sir Isaac Pitman* (1902); *A Plea for Alphabetic Reform* (1905).

PITMAN, SIR ISAAC; 1813, Jan. 4—1897, Jan. 22; inventor of the Pitman system of phonography, the method now most generally in use (see SHORTHAND); born at Trowbridge, Wilts., England. He was educated at the British and Foreign School Society of London; in 1832 began to teach at Barton-on-Humber; and in 1837 he published *Stenographic Soundhand*. The latest and most important treatise on phonography is the *Shorthand Instructor*. For over fifty years he edited the *Phonetic Journal*, and issued a library of shorthand works ranging from the complete *Bible* to *Tom Brown's School Days*, and other popular fiction of the day. For many years he was greatly interested in the subject of reform in English spelling. He was knighted in 1894 for his 'great services to stenography.'

PI'TO, or Po'so: see CHICA.

PI'TON BARK: see CARIBBEE BARK.

PITRA, *pē-trâ'*, JEAN BAPTISTE: cardinal: b. Champforgueil, France, 1812, Aug. 31. He was educated for the priesthood, and after teaching for a while, joined the benedictine order of monks at Solesme. He made a special study of ecclesiastical antiquities, and published in five vols. a collection of documents throwing much light on church history, materials for which were obtained in the principal libraries of Europe. Under the direction of the pope he visited Russia, 1858, for special study. He became a member of the Sacred College 1862, was made a cardinal 1863, and a cardinal-bishop 1879. In addition to the work above named, he has published biographies, and various books relating to church history. Since 1869 he has held the office of 'librarian of the Holy Roman Church.'

PI'TRI [Sanskrit, literally, 'father' = Latin *pater*, in the plural *Pitaras;* but in Eng. translations from the Sanskrit usually Anglicized to *Pitr'is*]: in a general sense, the deceased ancestors of a man; but in its special sense in Hindu mythology, an order of divine beings inhabiting celestial regions, and receiving into their society the spirits of those mortals for whom the funeral rites (see S'RÂDDHA) have been duly performed. They include, therefore, collectively the manes of the deceased ancestors; but the principal members of this order are beings of a different nature and origin. According to Manu, they were the sons of Marîchi, Atri, Angiras, and the other R'ishis or saints produced by Manu, son of Brahmâ; and from them issued the gods, demons, and men. According to several Purânas (q.v.), however, the first Pitr'is were the sons of the gods; and to reconcile this discrepancy, a legend relates that the gods having offended Brahmâ by neglecting to worship him, were cursed by him to become fools; but upon their repentance, he directed them to apply to their sons for instruction. Being taught accordingly the rites of expiation and penance by their sons, they addressed the latter as fathers; whence the sons of the gods were the first Pitr'is (fathers). See Wilson's *Vishn'u-Purân'a*. Manu enumerates various classes of Pitr'is in defining those who were the ancestors of the gods, those who were the ancestors of the demons, and those from whom proceeded the four castes severally; but he adds, at the same time, that these are merely the principal classes, as their sons and grandsons indefinitely must likewise be considered as Pitr'is. The Purân'as divide them generally into seven classes, three of which are without form, or composed of intellectual, not elementary substance, and assuming what forms they please, while the four other classes are corporeal. In the enumeration, however, of these classes the Purân'as differ. The Pitr'is reside in a world of their own, Pitr'i-loka, sometimes supposed to be the moon; according to the Purân'as, it is below the paradise of Indra, and is the abode also of the souls of devout Brahmans. As to their worship, described in the Purân'as see S'RÂDDHA. See Wilson's *Vishn'u-Purân'a*.

PITT, WILLIAM: 1759, May 28—1806, Jan. 23; second son of the Earl of Chatham and of Lady Hester Grenville, daughter of the Countess Temple. His genius and ambition displayed themselves with almost unexampled precocity. 'The fineness of William's mind,' his mother writes, when he was 12 years old, 'makes him enjoy with the greatest pleasure what would be above the reach of any other creature of his age.' Excessive delicacy of constitution prevented education at a public school, but he studied at home with success; and in 1773 he was sent to the Univ. of Cambridge, where his knowledge of the classics seems to have astonished veteran critics. To modern literature he appears to have been indifferent —he knew no continental language except French, and that imperfectly. Among English poets, he liked Milton best; the debate in Pandemonium being his favorite passage. In 1780 P. was called to the bar. He took chambers in Lincoln's Inn, and joined the western circuit. A general election having taken place in the autumn of the same year, he stood for the Univ. of Cambridge; but he was at the bottom of the poll. Through the influence of the Duke of Rutland, he obtained a seat in parliament as member for Appleby. Lord North was prime-minister. The opposition consisted of two parties; one led by Rockingham and Fox, the other by Lord Shelburne. The latter consisted chiefly of the old followers of Chatham; and to this party Pitt naturally became attached. 1781, Feb. 26, he made his maiden speech. It was in favor of Burke's plan of economical reform, and was a splendid success. 'It is not a chip of the old block,' said Burke; 'it is the old block himself.' Shortly before the meeting of parliament, in the autumn of 1781, the news arrived of the surrender of Cornwallis and his army. In the debate on the address, P. spoke with even more energy and brilliancy than on former occasions. No one was so loud in eulogy as Henry Dundas, lord advocate for Scotland; and from this night dates a connection between him and P., broken only by death. After several defeats the ministry resigned; Rockingham was called on to construct a cabinet. P. was offered the vice-treasureship of Ireland; but he declined to accept a position which did not confer a seat in the cabinet. 1782, May 7, he made his first motion for reform in the representation of the people; which was lost by only 20 votes in a house of more than 300 members. The reformers never again had so good a division till 1831. At the end of 3 months after his accession to office, Rockingham died; Lord Shelburne succeeded to the head of the treasury; and P., at the age of 23, became chancellor of the exchequer. In opposition to the govt., there was then formed a coalition known as 'The Coalition.' On Lord Shelburne's resignation 1783, the king, who hated the Coalition, tried to persuade P. to take the helm of affairs; but he declined. The Duke of Portland succeeded, with Fox and North as secretaries of state. P., from the opposition benches, brought for a second time

the question of parliamentary reform before the house. His motion was lost by 293 votes to 149. On the prorogation, he visited the continent for the first and last time. In 1783, the ministry having been defeated on a motion for transferring the government of India to parliament, P. became first lord of the treasury and chancellor of the exchequer. But parliament was against him: in 16 divisions, 1783, Dec. 17—1784, Mar. 8, he was beaten. The nation, however, was in his favor; both on account of his policy, and from admiration of his private character. Pecuniary disinterestedness is what all can comprehend; and even when known to be overwhelmed with debt, when millions were passing through his hands, when the greatest men in the land were soliciting him for honors, no one ever dared to accuse him of touching unlawful gain. At the general election (1784) 160 supporters of the Coalition lost their seats, P. himself heading the poll for the Univ. of Cambridge. He was now, at 25 years old, the most powerful subject that England had seen for many generations. He ruled absolutely over the cabinet, and was the favorite at once of the sovereign, of the parliament, and of the nation; and from this date his life becomes the history of England. For 17 eventful years he held his great position without a break. In 1784 he established a new constitution for the E. India Company. In 1786 he carried through a commercial treaty with France on liberal principles. In the same year he established a new sinking fund; a scheme which experience has shown wrong in principle, though long viewed with favor by the nation. To exertions which then began for abolition of the slave-trade, he gave the help of his eloquence and power. 1788–9 he maintained against Fox the right of parliament to supply the temporary defect of royal authority occasioned by the incapacity of the king. The year 1793 saw the beginning of the great war with France. It is certain—though authorities differ as to the cause—that P.'s military administration was eminently unsuccessful. But no disaster could daunt his spirit. When a new French victory, a rebellion in Ireland, a mutiny in the fleet, and a panic in the city had spread dismay through the nation, P. from his place in parliament poured forth the language of inextinguishable hope and inflexible resolution. Disaster abroad was regularly followed by triumph at home, until at last he had no longer an opposition to encounter. In 1799 he effected the union with Ireland. It was part of his scheme to relieve the Rom. Cath. laity from civil disabilities, and to grant a public maintenance to their clergy; but the obstinacy of the king frustrated this design. Chagrined by this failure, P. resigned office 1801. He was succeeded by Addington, to whom for a while he gave his support. In 1804 he returned again to the head of the treasury, which position he held till his death. His death was doubtless hastened by the stupendous success of Napoleon. The peculiar look which he wore during the last days of his life was patheti cally termed by Wilberforce 'the Austerlitz look.' The impeachment also of his friend, Lord Melville, is supposed

to have hastened his end. It gave him, he said in parliament, a deep pang. His voice quivered as he uttered the word; and it seemed as if the man of iron were about to shed tears. 'He was,' says Macaulay, 'a minister of great talents, honest intentions, and liberal opinions, . . . but unequal to surprising and terrible emergencies, and liable in such emergencies to err grievously, both on the side of weakness and on the side of violence.' But what man ever lived, we may ask, who, placed in such circumstances as P., would not often have greatly erred? His policy was liberal beyond his age, at least he wished it to be so, though he was often obliged to yield to the prejudices of his sovereign. He resigned office because he could not carry Rom. Cath. emancipation. He laid before the king unanswerable reasons for abolishing the Test Act. He was more deeply imbued with the doctrines of free-trade than either Fox or Grey. It cannot indeed be denied that he was addicted to port-wine, and that he died overwhelmed with debts; parliament voting £40,000 to his creditors. High as his character stands, it would have stood higher had he united the virtue of frugality to that of disinterestedness. See *Life of Pitt* by Lord Stanhope (Lond. 1861); also Lord Macaulay's *Biographies* (Edin. 1860). In the former work, II. 185, is a valuable criticism on Macaulay's memoir.

PITT, William, Earl of Chatham: see Chatham, Earl of.

PITTA, *pĭt'tâ:* genus of gaily colored birds, which with several other genera form the family *Pittidæ*, order *Clamatores*. They have been known as ant-thrushes; but they are neither of the thrush family and its order, nor are they ant-eaters otherwise than insectivorous in general. Though numbering 50 species, the family seems to be a declining one, confined with few exceptions to the E. Indies, at a maximum in Borneo and Sumatra. What is remarkable is that small islands have their own one or two species, and this Dr. Wallace mentions as one of many similar facts in favor of isolation producing species. The most brilliantly colored are on the smaller islands. The family and the S. American tanagers are almost the only groups of birds that have no set of characteristic colors, the species exhibiting usually three colors at least, but these may be any colors —blue, crimson, green, yellow, purple, black, or white. *P. coronata*, ranging from the Himalayas to Ceylon, combines black, white, fawn, rose-red, and sky-blue. P. *angolensis* is the one African species. The song of the Pittas is mostly two notes of plaintive whistling. Other names for them are Cittas and Breves, and they were formerly classed as *Brachyuridæ*.

PITTACAL, n. *pĭt'tă-kăl* [Gr. *pitta*, pitch; *kalos*, beautiful]: a solid substance of a fine blue color, obtained from the oil of wood-tar.

PITTACUS, *pĭt'ta-kŭs:* one of the 'Seven Wise Men' of anc. Greece: B.C. 651—B.C. 569; b. at Mitylene, in the island of Lesbos. The incidents of his life do not rest on a secure historical basis; but he is not to be deemed a merely traditionary personage. Doubtless his career and character were substantially what later history represents them. About B.C. 611, in conjunction with the brothers of Alcæus the poet, he overthrew the 'tyrant' Melanchrus, and put him to death. He next figures in the contest between the Lesbians and the Athenians for possession of Sigeum in the Troad, and showed as much valor on the battle-field as Alcæus did cowardice. His townsmen, the Mitylenæans, were so pleased with his deeds of prowess, that they gave him a portion of the city-territory, which he dedicated to sacred uses, and which was known long after as the 'Pittaceian land.' Meanwhile, the civic struggles did not cease; the democratic party, roughly represented by a series of popular 'tyrants,' were in the ascendant, and the oligarchic aristocrats, at the head of whom was Alcæus, were finally banished. P. was subsequently chosen dictator, B.C. 589, to prevent the turbulent exiles from returning to Mitylene, and ruled absolutely with great success for ten years, after which he voluntarily withdrew into honored retirement. Many of the traditional anecdotes concerning P. are dubious; but they all attribute to him the same characteristics—great moral sagacity, a contempt of pomp, and a plain practical understanding. His favorite maxim, *Gnōthi Kairòn* ('Know the fitting moment'), may be commended to all statesmen and politicians. Of his 600 didactic verses, only four are extant, and these show that he was strongly impressed with the falsehood and insincerity of men. See Schneidewin's *Delectus Poesis Græcorum Elegiacæ*, etc.

PITTANCE, n. *pĭt'tăns* [It. *pietanza;* Sp. *pitanza;* F. *pitance*, allowance of appetizing food, allowance of food for a single person—from mid. L. *pictantia*, the allowance of esculents or appetizing food to a monk or nun, valued at a *picta*, a small coin issued by the Counts of Poitiers]: any small portion allowed or assigned, particularly applied to money.

PITTOSPORACEÆ, *pĭt-tō-spō-rā'sē-ē:* natural order of exogenous plants, allied to *Vitaceæ* (the Vine, etc.), and containing nearly 100 known species of trees and shrubs, chiefly Australian, though a few are natives of parts of Asia, Africa, and the islands of the Pacific. To this order belongs the genus *Billardiera* (q.v.). The genus *Sollya* also deserves notice, as containing beautiful greenhouse climbers.

PITTSBURG: city, Crawford co., Kan.; on the Atchison, Topeka and Santa Fé, the Kansas City, Pittsburg and Gulf, the Missouri Pacific, and the St. Louis and San Francisco r.rs.; 55 m. e. of Independence. P. is in a coal-mining region; has large deposits of coal, zinc and brick works and other manufactories, 8 churches, 3 banks, good public schools, and 4 newspapers.—Pop. (1890) 6,697; (1895) 8,982; (1900) 10,112; (1910) 11,755.

PITTSBURG, *pits'bĕrg:* city, cap. of Allegheny co., in w. Penn., at the junction of the Monongahela and Alleghany rivers.

Topography.—P. has an area of 28¼ sq. m., between the Alleghany and Monongahela and s. of the latter. The central point from which growth began is that between the Monongahela and Alleghany rivers, where they meet to form the head of the Ohio, inclosing a plain of triangular form and about ¾ of a m. along each side, with hills e. of its base across from river to river. This part of the city is now the center of the retail and business district. On the banks of the two inclosing rivers a strip of low ground, usually a few hundred ft. wide, affords sites for manufacturing establishments, which extend 2 m. or more down the Ohio and 7 m. up the Monongahela and the Alleghany. At different points these strips of low river ground are widened by the falling back of the precipitous hills facing the rivers, and afford sites for suburbs across the Monongahela. The most important residential section of the city is in the eastern district, known as the 'East End.' Allegheny City, across the Alleghany river, is commercially and socially one with P., although municipally distinct. The two are united by 10 bridges for ordinary traffic and several railway viaducts. There is also a railroad bridge connecting Brunot's Island in the Ohio river, just below P., with the mainland, the floating of which to its position, 1890, Aug. 19, was a remarkable engineering feat.

Industries.—P. is one of the most important centres of bituminous coal mining, and of the production of petroleum and natural gas. In the great western bituminous coal basin of Penn., 'the great P. seam' lies central to the whole field, and the P. district of coal-mines supplies about half the total soft coal for the U. S. The oil-wells of the region on the north have made P. the center of the oil trade of the world. From the date of the first well, 1859, Aug., to 1867, P. supplied over 60 per cent. of the whole foreign exportation of petroleum, and is the chief mart for the output of w. Penn., Ohio, and W. Va. Natural gas came very prominently to public notice 1878, with an extraordinary outburst from a well which was being driven for oil 18 m. e. from P., and in 1884 was piped to P. and came rapidly into general use, both for domestic and industrial fuel.

Owing to the abundance of fuel, cheap and easily obtained, P. has become the centre of the iron and steel industry. In 1792 a blast furnace was erected at P., but soon abandoned, because no ore could be found in the vicinity, and it was not until 1859 that pig iron was again made in the city. In 1812 the first rolling mill was built, and in 1813 the first steel furnace. While there was a considerable increase in the quantity of the steel manufacture, the quality was variable until 1860, when crucible cast steel of the highest grade

was made, marking the beginning of a new industry; the manufacture of Bessemer steel was begun a few years later. The census of 1900 reported a capital of over $75,000,000 invested in the manufacture of iron and steel; and later statistics show that P. produced 25 per cent. of the pig iron and 40 per cent. of steel manufactured in the U. S. P. also surpassed all other cities in the manufacture of steel rails and armor-plate. The largest establishments are those of the American Iron Works and the U. S. Steel Corporation. The glass manufacturing industry is also one of importance; a glass factory established in 1797 at P. was the first to use coal as a fuel, and the first successful use of natural gas as a fuel was also made at a factory near P. in 1883. From 1810 an establishment was in operation for the manufacture of flint glass. In 1900 there was a capital of $3,588,302 invested in the manufacture of glass in the city. Another important industry is that of the manufacture of electrical machinery and supplies, the Westinghouse Company having their central plant in P. There are also extensive machine shops, foundries and car works, chemical industries, meat-packing establishments, and the largest cork factory in the world. The first steam paper mill in the U. S. was built at P., but the manufacture of paper does not hold an important place among the industries of the city.

Transportation.—The inland water communications of P., by river and canal, have been important in its history.

The first steam vessel launched on the Ohio was built in P. in 1811, and shortly afterward regular commerce was established between P. and the South, and till 1855 the principal route from the middle states to the s. and s. w. was that of the Ohio river and its connections. The shipments of coal by this route are still large, and of considerable importance. P. is, however, primarily a railroad centre, being one of the great gates between the eastern and mid-continent states. The railroads entering the city include the Pennsylvania Railroad system and the Baltimore & Ohio system. The tonnage of freight brought into and carried out of Pittsburg is over 80,000,000 tons annually, exceeding that of any other American city.

Banks.—The first bank in P., established in 1814, is the oldest west of the Appalachian mountains. With the growth of the industries of the city, the banks have grown correspondingly in wealth and importance. The capital of the banks exceeds $414,000,000, and the clearing house exchanges in 1903 aggregated over $2,000,000,000, placing P. sixth among the cities of the U. S. in the volume of its clearing-house business.

Religion and Charities.—There are in P. over 300 churches, representing every denomination; the Presbyterians and Methodists are the two strongest Protestant denominations of the city. It is the seat of a Roman

PITTSBURG.

1. Entrance to Highland Park.
2. Carnegie Library.

Catholic bishopric, and the new Catholic cathedral is considered one of the most beautiful edifices of the city. There are numerous hospitals in P., of which 14 are of special importance, and 5, the Homeopathic, Mercy, St. Francis, South Side, and Western Pennsylvania, have training schools for nurses. There are also many other charitable institutions, including a Newsboys' Home, asylums for the deaf and dumb and for the blind, homes for the aged, for widows, and for orphans, a house of refuge for fallen women, and a home for released convicts. There are also free baths, supported by private enterprise, and a number of other enterprises for the betterment of the social conditions. P. is the centre of the philanthropical work of the United Presbyterian Church, and the headquarters of the Presbyterian Board of Missions to the Freedmen.

Educational Institutions.—There are excellent public schools in P.; many of the most recently erected buildings are large and well equipped; manual training is made a part of the curriculum in the intermediate grades. There are three high schools, the Central, the Commercial, and the Wilkinsburg, of which the Central is the oldest, established in 1855. There are four evening schools 35 kindergartens, and 10 vacation schools under the direction of the city board of education. The Western University of Pennsylvania, the first educational institution chartered west of the Alleghanies, is located in Allegheny City; but its professional schools of law, medicine, dentistry, and pharmacy are in P. P. is the seat also of the Pennsylvania College for Women, and of the College of the Holy Ghost, a Roman Catholic institution. There are a number of private academies of high rank, two business colleges, and the Carnegie Schools of Applied Science. The Carnegie Institute, founded in 1896 by Andrew Carnegie, includes the library, a music hall, a museum, and an art gallery. The library is one of the largest public libraries of the United States, and is especially noted for its work in the children's department, and for its training class for children's librarians. Its work is supplemented by the work of the branch libraries in different parts of the city. Many excellent concerts are given in the music hall, and an annual international art exhibit held in the art gallery. In the fall of 1906, the Carnegie Institute was threatened by destruction from fire, but this was fortunately prevented with a loss of only $10,000. Among the other libraries of the city, the Allegheny County Law Library is of especial importance.

Parks and Public Buildings.—There are a number of small parks in P., but the two largest and most important are Schenley Park and Highland Park. The former was the gift of Mrs. Mary E. Schenley. The Carnegie Library and Museum stands at its main entrance, and the Phipps Conservatory, the largest in the U. S., is within the park. The Zoological Gardens are

in Highland Park; the two are connected by a system of boulevards. In addition to the building of the Carnegie Institute, which is the most beautiful of its kind in America, the most notable public buildings are the Allegheny County Court-house, the U. S. Custom-house and Post-office, and the City Hall. There are also a number of large and important business buildings, including the Frick building, the Carnegie building, and the People's Savings Bank, and numerous theatres and halls, of which that of the Pittsburg Exposition building is perhaps most notable.

Water Supply, City Transit, etc.—The water-works of P. date from 1824, when a supply was taken from the Alleghany river about a mile from its mouth by pumping to a reservoir of 7,500,000 gals. capacity, and thence to a high service basin of 3,000,000 gals. capacity. New works nine m. farther up the Alleghany were constructed half a century later, at a cost of about $5,000,000, with four pumping-engines of the largest horizontal type, and these are owned and operated by the city. There is an excellent system of electric street railroads, operating in all about 250 miles of track; and there are as many as 50 bridges owned by the city in addition to the railroad bridges.

History.—In 1754, when the French were attempting to lay claim to the Ohio valley, a party of English from Virginia began the construction of a fort on the site of P. Before the work was completed they were forced to withdraw from the position by the approach of a large body of French troops. The French built Fort Duquesne, on the site, and having defeated General Braddock, in 1755, held the region under their control till 1758. They were then driven out by a British force under Gen. Forbes. George Washington was one of the British officers, and at his suggestion, the name of Fort Duquesne was changed to Pittsburg; extensive fortifications were erected, and in 1764 a town was laid out around the fort. The lands of the vicinity were surveyed first for the heirs of William Penn 1769, and designated (5,766 acres) the Manor of Pittsburg. It became an important frontier town, and was a centre of trade with the Indians; during the French and Indian wars, numerous engagements were fought at or near P. It was abandoned as a post by the British in 1772, Oct.; a contest to include it within the bounds of Va. was decided in favor of Penn. 1779, Aug. 31; it was resurveyed in 1783 by George Woods, incorporated as a village in 1794, and as a city in 1816. Destructive floods occurred 1832 and 1852, and in April, 1845, 56 acres of the business centre were burned. Notable incidents of the history of P. have been the enormous production, during the Civil war, of shot, shell, cannon, armor plates, wagons, gun carriages, harness, infantry and cavalry accoutrements, clothing, etc., etc.; and the strike riots of 1877, July and Aug., when fighting took place, with the killing of about 25 men and the wound-

ing of many more, and the destruction of railroad buildings and of freight cars. Since 1872 several acts of incorporation have been passed, the limits of the city enlarged, and a number of neighboring boroughs absorbed. The city government is composed of a mayor, controller, treasurer, and select and common councils, all elected by the people, and of administrative officials for depts. of police, fire, assessments, and public works. Pop. (1900) 321,616; (1910) with Allegheny City, 553,905.

PITTSBURGH LANDING, Battle of. See Shiloh, Battle of.

PITTSFIELD, Mass., city and county-seat of Berkshire County: situated on a rolling plateau, 1038 feet above sea-level, between the Hoosac Mountains on the east and the Taconic Mountains on the west; between two branches of the Housatonic River; and on the Berkshire Division of the New York, N. H. and H., and the Boston & Albany R. R.'s.; 151 miles by rail west of Boston, 152 miles N. N.E. of New York City and 50 miles east of Albany. An excellent system of electric roads connects the city with the surrounding towns.

Industries.—Pittsfield is noted more especially as the central residential section of the Berkshire Hills than as a manufacturing town, but carries on a considerable trade, the leading manufactures being cotton, wool, silk, paper, electrical machinery, automobiles, shoes, and the tel-electric piano-player.

Public and Historic Buildings.—Among the most prominent of the public buildings are the marble courthouse, costing about $350,000; the Berkshire Athenæum, built of blue limestone and polished granite at a cost of $100,000, and containing a library of 50,000 volumes, an art gallery and museum; the Museum of Natural History and Art; the Berkshire Life Insurance Building; the County Savings Bank; and the Cathedral of Saint Joseph. There are also three theatres, and a number of well appointed hotels. Among the many historical homes are the Plunkett House, where Longfellow wrote *The Old Clock on the Stairs,* Holmesdale, once the country-seat of Oliver Wendell Holmes, 'Arrowhead,' formerly the residence of Herman Melville, and the Country Club-house, built about 1784.

Churches, Charitable and Educational Institutions, etc.—Pittsfield has 14 churches of various denominations. The charitable institutions include the Berkshire County Home for Aged Women and the House of Mercy. The educational facilities are excellent, comprising a high school erected at a cost of $200,000, public and parish elementary schools, Saint Joseph's Academy, and the Henry W. Bishop, 3rd, Memorial Training School for Nurses, an adjunct of the House of Mercy. Pittsfield is also the headquarters of the Berkshire Historical Society.

Public Works, Parks, Lakes, etc.—The principal streets

are paved with asphalt and are lighted with gas and electricity, and trolley lines render all parts of the city easily accessible. There are three parks, one of which, that in the centre of the city, is adorned by the original statue, 'The Massachusetts Color Bearer,' by Launt Thompson. Dawes Park is devoted mainly to athletic and open-air contests. The large exhibition grounds of the Berkshire Agricultural Society have been in existence since 1810. The largest lakes are Pontoosuc, Onota, upon the eastern shore of which a public park has been laid out, and Lake Ashley, lying to the east of the city and high up among the hills and giving to the city an unfailing supply of purest water.

Banks, Newspapers, Clubs, etc.—Pittsfield has three National banks with a combined capitalization and surplus of $1,500,000 and deposits of $2,000,000, two savings banks with deposits of $6,000,000; a loan and trust company, capital $150,000 and deposits of $725,000; and a coöperative bank, deposits $600,000. There are published in the city two daily and five weekly periodicals. Among the principal clubs are the Pittsfield Country Club, which owns an estate of 200 acres, inclosed within the grounds being Morewood Lake, the Pittsfield Boat Club, occupying a spacious house on the shores of Lake Pontoosuc, the Park, Wednesday Morning (Ladies), and Monday Evening Clubs.

History, Government and Population.—Pittsfield was first settled in 1743, became an incorporated town in 1761, and a chartered city in 1891. It was first known as 'Boston Plantation No. 3,' and 'Poontoosuck' but when incorporated the name was changed to Pittsfield in honor of the elder Pitt. Included within the corporate limits are several small villages.

The government, administered under a revised charter in 1895, provides for a mayor who holds office one year and a city council of two branches, viz., board of aldermen, seven members, and common council, fourteen members. The mayor appoints the license commissioners and the council elects several of the administrative officials. The school committee is chosen at the popular election. The city owns and operates the waterworks. Pop. (1900) 21,766; (1905) 25,000; (1910) 32,121. Consult: Smith, *History of Pittsfield;* J. E. A. Smith, *Taghconic;* Holland *History of Western Massachusetts.*

PITTSTON, *pĭts'ton*, Pa., city in Luzerne County; on the Susquehanna River, and on the Delaware & H., the Delaware, L. & W., the Lehigh Valley, and the Central of N. J. R.R.'s; about nine miles southwest of Scranton. On the opposite side of the river is West Pittston, which is mainly a residential town. Pittston is an industrial centre of considerable importance. It is connected by belt-line electric railroads with Nanticoke, Plymouth, and Wilkes-Barre. It was settled in 1770, laid out in 1768, incorporated as a borough in 1803, and in 1894

was chartered as a city. It was named in honor of William Pitt, when it was first laid out, but for some years it was called Pittston Ferry. It is in the midst of the Wyoming anthracite region and its chief industries are connected with the mining and shipping of coal. In the vicinity are deposits of fire-clay. The chief manufacturing establishments are flour and lumber mills, knitting mills, foundries, machine shops, brick and terra-cotta works, stove and engine works, breweries, tool works, ladies' underwear factory, dye works, and steel range works. The number of men engaged in the mining and shipping of coal is in the thousands. The principal educational institutions are the public and parish schools, and a fine public library. It has a hospital, which was opened in 1893. The banks, national and savings, have a combined capital of $400,000. Pop. (1900) 12,556; (1910) 16,267.

PITUITARY, a. *pĭ-tū'ĭ-tėr-ĭ* [L. *pitŭīta*, phlegm—from Gr. *ptūō*, I spit: It. *pituita;* F. *pituite*, phlegm]: that secretes or conveys phlegm or mucus. PITUITE, n. *pĭt'ū-īt*, phlegm or mucus. PITUITOUS, a. *pĭ-tū'ĭ-tŭs*, consisting of mucus or resembling it. PITUITARY GLAND or BODY, small reddish-gray mass of oval form, weighing six to ten grains, and situated on the sella turcica of the sphenoid bone, on the floor of the cavity of the skull. It derives its name from having been supposed to secrete the fluid now known to be yielded by the Schneiderian or pituitary membrane of the nostrils. Its function is not known, but it is supposed to furnish an internal secretion of importance in metabolism, and to bear a relation to the thyroid gland. It is often found diseased in cases of acromegaly. PITUITARY MEMBRANE, the fine membrane lining the nostrils.

PITY, n. *pĭt'ĭ* [F. *pitié;* It. *pieta*, pity, compassion—from L. *pĭĕtātem*, piety, compassion—from *pĭus*, devout, pious]: compassion or sorrow excited by the distress or sufferings of another; fellow suffering or feeling; compassion accompanied with some act of charity; sympathy; a thing to be regretted; a thing to be looked upon as a misfortune, as, 'the more is the *pity*'; used in the plu., as 'it is a thousand PITIES, *pĭt'ĭz*,—that is, it is a thing to be very much regretted: V. to feel pain or grief for one in distress; to compassionate; to be compassionate; to be affected with pity. PIT'YING, imp. *-ĭ-ĭng:* ADJ. showing pity; compassionate. PIT'IED, pp. *-ĭd*. PIT'IER, n. *-ĭ-ėr*, one who pities. PIT'IABLE, a. *-ă-bl* [F. *pitoyable*, compassionate]: deserving pity; lamentable; mournful. PIT'IABLY, ad. *-blĭ*. PIT'IABLENESS, n. *-bl-nēs*, state of being pitiable; state of deserving compassion. PIT'IFUL, a. *-fûl*, in Scrip., tender; moving compassion; generally used in an ill sense, contemptible; paltry; insignificant. PIT'IFULLY, ad. *-lĭ*. PIT'IFULNESS, n. *-nēs*, the state of being pitiful. PIT'ILESS, a. *-lĕs*, wanting pity; hard-hearted; cruel; merciless. PITI'LESSLY, ad.

-lĭ. PIT'ILESSNESS, n. *-nĕs,* the state of being pitiless. PIT'YINGLY, ad. *-lĭ,* in a pitying manner; sympathizingly. —SYN. of 'pitiable; wretched; miserable; mournful; woful; rueful; sorrowful; affecting; lamentable; doleful;—of 'pitiful'; despicable; contemptible; paltry; tender; compassionate; miserable;—of 'pitiless'; merciless; cruel; unmerciful; hard-hearted; compassionless;—of 'pity,' n.; mercy; clemency; leniency; compassion; commiseration; condolence; sympathy; fellow-feeling.

PITYRIASIS, n. *pĭt'ĭ-rī'ă-sĭs* [Gr.—from *pitu'ra,* scurf or bran]: one of the squamous or scaly diseases of the skin, in which there is a continual throwing off of bran-like scales of epidermis, which are renewed as fast as they are lost. It may occur on any part of the body, giving rise to brown patches, in which are sensations of itching, tingling, or pricking. It is more easily cured than the other scaly diseases, and its removal can generally be effected by frequent use of the warm bath; or, if that fails, recourse may be had to alkaline or sulphur baths; due attention being at the same time given to the general health. It sometimes occurs on the scalp, when it is known as *dandruff,* and must be treated with weak alkaline lotions; or, if these fail, with tar ointment if there is no inflammation. There is a variety known as *P. versicolor,* due probably to a parasitic fungus, the *Microsporon furfurans.* This variety may be detected by microscopic examination of the exfoliated scales, when the spores and filaments of the fungus will be shown. The treatment must be solely local. Probably the best remedy is the application of a saturated watery solution of sulphurous acid gas, or of one of the sulphites dissolved in diluted vinegar. PIT'YROID, a. *royd* [Gr. *eidos,* resemblance]: bran-like.

PIU, ad. *pī-ö* [It.; L. *plus,* more]: in *music,* a word prefixed to another in order to indicate an increase to its significance; a little; more, as *piŭ allegro,* a little quicker.

PIUMA, n. *pĭ-ü'ma* [etym. doubtful]: mixed fabric of light texture used for men's coats.

PIURA, *pē-ô'râ:* city, capital of the province of Piura in Peru, on the river Piura, 523 miles n.w. from Lima. It is one of the most important places in n. Peru, and has considerable trade. The rainfall is limited, but the soil is fertile; and in the surrounding region sugar-cane, cotton, and tobacco are produced, and the live stock industry is considerably developed. Iron, lead, and other minerals abound, and there are large quantities of petroleum. The principal manufactures are leather and soap. Piura was founded in 1531 by Pizarro, and was the first place in Peru settled by Europeans. It was formerly called San Miguel, and is now sometimes referred to as San Miguel de Piura. Pop. of city about 15,000. The department of Piura has an area of about 16,000 square miles and a population of about 215,000.

PIUS, *pī'ŭs*, I., SAINT: Bishop of Rome: dates of birth and death not known (bp. of Rome 158–167); said to have been born in Aquileia, to have been son of Rufinus, and to have died a martyr. His history is largely conjectural. But all this, including the above dates, is doubtful. He is on record as an opponent of such heresies as those of Marcion and Valentinus, and to him is attributed the observance of the festival of the resurrection on Sunday. He has been cannonized as a martyr, his day being July 11, Certain letters under his name are considered unauthentic.

PIUS II. (originally known as ÆNEAS SYLVIUS): Pope of Rome: 1405–64, Aug. 14 (reigned 1458–64); b. Corsignano, in the duchy of Siena; of the noble family of Piccolomini. His early life was not free from serious irregularities, but he made amends by subsequent decorous conduct; and his eminent abilities as a canonist led to his employment, when but 26 years of age, as sec. of the Cardinal of Fermo, in a post of the highest confidence at the Council of Basel (q.v.). He was intrusted by that council—whose views in its conflict with the pope he fully shared—in several commissions of great importance; and on the election of the antipope, Felix V., Æneas Sylvius was chosen as his secretary. But having been sent by him as ambassador to Emperor Frederick III., he was induced to accept office in the imperial court, and served the emperor on several embassies and other important missions. In the difficulties between Frederick and Pope Eugenius IV., after the council of Florence, Æneas conducted so skilfully a negotiation with which he was intrusted, that the pope retained him as sec. in his court. His views of church matters having undergone considerable change, he continued in favor under the successor of Eugenius, Nicholas V., 1447; and under Callistus III. he was elevated to the cardinalate. On the death of Callistus 1458, he was elected pope, and took the name Pius II. His pontificate was embarrassed by contests on German affairs, but it is rendered memorable chiefly by the sustained efforts which P.—first in this policy of a long line of pontiffs, to whom the public security of Europe owes deep obligation—made to organize an armed confederation of Christian princes to resist the progress of the Turkish arms: this organization, however, for a long time had no considerable results. The literary reputation of the scholar, Æneas Sylvius, has partially eclipsed the historical fame of the Pope Pius. He was one of the most eminent scholars of his age. His works were published at Basel (1 vol. fol. 1551), but many of his works are not included in that edition. They consist chiefly of histories, or historical dissertations and materials of history; but the most interesting portion of his collected works are his letters, very numerous, and full of details characteristic of the writer and of the age. The same may be said of a biographical commentary, which is in truth an autobiography, written chiefly from his own dictation, by his secretary, John Gobellinus; pub. Frankfort 1614. See Voight's *Life of Pius* (Berl. 1856).

PIUS IV. (Giovanni Angelo Medici). Pope of Rome: 1499, Mar. 31—1565, Dec. 9 (reigned 1560–65); b. Milan; uncle of St. Carlo Borromeo. He is notable from his connection with the famous creed known under his name. His pontificate is memorable chiefly as that in which the protracted deliberations of the council of Trent (q.v.) were brought to a close. P. had the duty, 1563, Dec., of issuing the bull confirmatory of its decrees. The well-known Creed of Pius IV., called sometimes the Tridentine Creed, was issued by P. as an embodiment of all the doctrines defined in that council.

PIUS V., Saint (originally named Michele Ghisleri): Pope of Rome: 1504–1572, May (reigned 1566–72); b. in the village of Bosco, near Alessandria; of poor parents. At the age of 14, he entered the Dominican order. His eminent merits were recognized by Paul IV., who named him Bp. of Satri, 1556, and cardinal 1557. Of austere habits, he carried into his administration the same rigor which distinguished his personal conduct; and when appointed inquisitor-gen. for Lombardy, he employed the most rigorous measures in repressing the Reformation, which had begun to effect an entrance. He was afterward translated to the see of Mondovi; and immediately after the death of Pius IV., he was chosen unanimously as his successor. P. carried into his pontifical life the same personal austerity and administrative rigor which he had evinced as bishop. Applying to others the same rules which he enforced on himself, he enacted severe laws for regulation of public morals, prohibiting bull-fights, suppressing prostitution, and proscribing a variety of popular but demoralizing exhibitions. The Roman Inquisition, too, under his government exercised a severity equalled in no other pontificate. He endeavored to enforce everywhere the disciplinary decrees of the Council of Trent; and the whole spirit of his pontificate is strikingly exhibited in the decree by which he ordered the yearly publication of the celebrated bull, *In Cœna Domini* (q.v.). It was an application to the 16th c. of the principles and legislation of the Hildebrandine epoch. But the most momentous event of the pontificate of P. was the expedition which he organized, with Spain and Venice, against the Turks, and which resulted in the great naval engagement of the Gulf of Lepanto, 1571, Oct. 7. He was canonized by Clement XI. 1712.

PIUS VI. (originally named Angelo Braschi). Pope of Rome: 1717, Dec. 27—1799, Aug. (reigned 1775–99); b. Cesena. He was selected by Benedict XIV. as his sec.; and under Clement XIII. he was named to several important appointments, which led finally, under Clement XIV., to his elevation to the cardinalate. On the death of Clement XIV., Cardinal Braschi was chosen to succeed him. The conflict with the civil power in the various states of Europe, in which, from the days of Innocent XI., the Roman see had been in some degree almost unceasingly involved, assumed under P. its complete and scientific development. His relations to Emperor Joseph of Austria and the Grand-Duke Leopold of Tuscany, who

persisted in reformation of the religious orders, etc., were far from amicable. The internal administration of P., however, was enlightened and judicious. To him, Rome owes the drainage of the Pontine Marsh, the improvement of the port of Ancona, the completion of the church of St. Peter's, the foundation of the new Museum of the Vatican, and the general improvement and embellishment of the city. These and similar projects were interrupted by the outbreak of the French Revolution. In 1793 a popular tumult at Rome, caused by the imprudence of a French political agent named De Basseville, and which resulted in his death, gave the French directory an opportunity of hostile demonstrations against the pope. In 1796 Bonaparte took possession of the Legations, and afterward of the March of Ancona, and by a threatened advance on Rome, extorted from P., in the Treaty of Tolentino, the surrender of these provinces to the Cisalpine Republic, together with a heavy war contribution. The year 1797 was marked by a continuance of the same vexatious measures; and at length the directory ordered the invasion of Rome; Berthier entered the city, 1798, Feb. 10, and took possession of the castle of San Angelo. P. was required to renounce his temporal sovereignty; and on his refusal, was seized, Feb. 20, and carried away to Siena, and afterward to the celebrated Certosa, or Carthusian monastery, of Florence. On the threatened advance of the Austro-Russian army in the following year, he was transferred to Grenoble, and finally to Valence on the Rhone, where, worn out by age and by the rigor of confinement, he died in the 82d year of his age and the 24th of his pontificate.

PIUS VII. (originally GREGORY BARNABAS CHIARAMONTE), Pope of Rome: 1742–1823, Aug. 20 (reigned 1800–23); b. Cesena. He entered the Benedictine order at an early age, and was employed in teaching philosophy and theology at Parma, and at Rome. He was appointed Bp. of Tivoli; was then made cardinal, and translated to the see of Imola. After the death of Pius VI., Cardinal Chiaramonte was chosen his successor. 1800, Mar. 14. Rome, which till this time had been in the occupation of the French, was restored to the papal authority; and in July, P. VII. entered into his capital; and in the following year the French troops were definitively withdrawn from the papal territory with the exception of the Legations. From this time, P., ably seconded by his sec. of state, Cardinal Consalvi, occupied a prominent place in the political as well as the ecclesiastical affairs of Europe. Bonaparte had resolved to restore religion in France on the ancient basis of connection with Rome. With this view, he entered into negotiations with P. VII. for establishment of a concordat suited to the new order of things. These negotiations were conducted at Paris, and were attended with many difficulties and delays, until at length Cardinal Consalvi repaired in person to the conference, and, by his energy and decision, disentangled the complicated embarrassments in which it was involved. The con

cordat was agreed to at Paris, 1801, July 15, ratified in Rome, Aug. 14; and published in Notre Dame 1802 on Easter Sunday. But simultaneously with it, and as if part of the same arrangement, was published a code of what were called 'Organic Laws,' seriously affecting the discipline of the church on marriage, on the clergy, and on public worship, which had never been submitted to P., and to which he not only had not consented, but to which he found himself compelled to offer every opposition. For the first year which succeeded the publication of the concordat, no occasion of difficulty arose; but conflict of principles was in the end inevitable. In 1804 Bonaparte having resolved on assuming the imperial crown, invited P. to come to Paris for the purpose of crowning him, and the pope, though with much hesitation, consented. He took advantage of his visit to demand the recall or modification of the articles, but without success; and though, during his visit to Paris, he was treated with great distinction and reverence, his relations with Napoleon from that date began to be less friendly. The French emperor proceeded from one petty outrage to another, until finally, 1808, Feb., the French troops, under Gen. Miollis, entered Rome, and took possession of the castle of San Angelo; and Apr. 2 a decree was issued annexing the provinces of Ancona, Fermo, Urbino, and Macerata to the kingdom of Italy. P., besides protesting against the usurpation, declared himself a prisoner in the French hands, and confined himself to his palace. The papers of the cardinal sec. were violently seized, and the pope was compelled to appoint a pro-secretary; and finally 1809, May 17, the usurpation was consummated by a decree annexing Rome and all the remaining papal territory to the French empire. This was the signal for the pope abandoning his lengthened policy of forbearance: June 10, P. issued a bull of excommunication, directed (without naming Napoleon) against the perpetrators and abettors of the invasion of the rights and the territory of the holy see. Soon afterward the French gen. ordered the removal of the pope from Rome; and P., without offering any resistance, but declaring that he yielded to force, was removed, first to Florence, then to Grenoble, thence for a longer time to Savona, whence, 1812, June, he was finally transferred to Fontainebleau. During this prolonged captivity, P. firmly but quietly resisted every effort to compel or seduce him from his policy. At Fontainebleau he was treated with much external respect; and on Napoleon's return from the Russian campaign, 1812, Dec., orders were given that the cardinals, with some exceptions, should be admitted to the presence of the pope. Under much pressure, both from the emperor himself—who is alleged by some to have acted with great rudeness, and even with personal violence—and from the ecclesiastics to whom the emperor confided his plans, P. was induced to sign a new concordat, an important provision of which was the recognition of the annexation of the Roman states to the empire. Having obtained the concession, Napoleon at once permitted the absent car

dinals to return, and of these many remonstrated so earnestly against the concordat, that, March 24, P. wrote to revoke his consent. Napoleon took no notice of the revocation; nor was it till after the disasters of 1813 that he began to seek an accommodation. P. refused to treat until he should be restored to Rome; and 1814, Jan. 22, orders were sent for his immediate return to his capital. Unattended by his cardinals, he was escorted to Italy, and remained at Cesena until the fatal campaign of the spring of 1814 placed Paris in the hands of the allies, when P. re-entered Rome amid the gratulations of the people, 1814, May 24—a day since held sacred in the Roman calendar. During the Hundred Days, he was again compelled to leave Rome; but after the campaign of Waterloo, he finally resumed possession, which was undisturbed for the rest of his life, and which extended to the whole of the ancient territory, including the Legations.

The last years of his pontificate were given to internal administration; and under the enlightened govt. of Cardinal Consalvi, were marked by wisdom and moderation. But the administration chiefly by ecclesiastics, and the secrecy of law procedure were resumed. P. repressed, too, with great vigor the disorder and brigandage which the long wars had introduced, and a whole village of notorious and incorrigible criminality, Somma, was razed to the ground 1819. He was equally vigorous in repressing secret societies, especially that of the Carbonari (q.v.). The ecclesiastical measures of his later period also were important. In 1814 he formally restored the suppressed order of the Jesuits (q.v.). In 1817 and the following years, he concluded concordats with Naples, with Prussia, Würtemberg, and other courts of Germany. In this and every other period of his life, P. was a model of gentleness, simplicity, benevolence, and Christian charity. 1823, July, having reached the patriarchal age of 81, he fell accidentally and broke his thigh. He sank gradually, and died in the following month.

PIUS IX. (Giovanni Maria Mastai Ferretti), Pope of Rome: 1792, May 13—1878, Feb. 7 (reigned 1846–78); b. Sinigaglia. His pontificate was during one of the most eventful periods in the history of the papacy. He was intended originally for the military profession—the Noble Guard; but symptoms of an epileptic tendency changed his plans. He received holy orders, and after exercising his ministry in Rome, was sent as 'auditor' of the vicar-apostolic to Chili. Having been successively abp. of Spoleto and of Imola, nuncio, and cardinal, he was, on the death of Gregory XVI. elected 'by acclamation' to succeed him. He took the name Pius IX., and entered at once on a course of reforms, by which he hoped to establish the papal govt. on a popular yet firm basis. He resolved to extirpate all abuses of administration, to withdraw the restrictions of personal liberty, to secularize the local administration, and to extend the rights of self-government. His first step was to grant an amnesty; and this measure, however humane and necessary, had the

result of drawing together into the Roman states a body of men whom an unhappy experience of exile had embittered against the existing order. For a time, the reforming policy of P. carried with it the affections of the people; but he soon fell short of the expectations which he had created. The outbreak of the French revolution of 1848, Feb., precipitated the crisis of popular discontent. In Nov. of that year Count Rossi, whom the pope had appointed his minister, was assassinated; and violent demonstrations were daily employed to compel the pope's assent to measures which he repudiated. Having at first confined himself to the Quirinal, he at length fled secretly from Rome to Gaeta, a Neapolitan seaport near the Roman frontier. A republic was proclaimed in Rome, the provisional heads of which proceeded to a complete and radical remodelling of the civil govt. of the state. P. from his exile addressed a remonstrance to the various sovereigns. 1849, Apr., a French expedition was sent to Civita Vecchia, which eventually advanced on Rome, and, after a siege of about 30 days, took possession of the city, and established a French army of occupation within the Roman state. The pope's govt. was re-established, but he did not return till 1850, when he again entered on the administration. In consequence of the unsettled condition of Italy and the failure of many of his early measures of improvement, he declared himself unable to proceed with the reformations which he had contemplated. After that time, his authority was maintained without interruption; but the discontent continued. After the war for the unification of Italy, the Legations, Ancona, and a considerable part of the papal territory southward in the direction of Rome, were annexed to the kingdom of Italy; but P. persistently refused to cede any portion or to enter into any compromise. His ecclesiastical administration continued very active, and proceeded on the strongest assumption of the right of independent action on the part of the church. In this view he re-established the hierarchy in England, he sanctioned the establishment in Ireland of a Rom. Cath. university, and condemned the principles on which the queen's colleges in that country were constituted. He concluded with Austria a concordat much more favorable to church authority than the existing ecclesiastical laws had permitted: see CONCORDAT. In 1854 he issued a decree propounding as a doctrine of the church the faith of the Immaculate Conception of the Blessed Virgin Mary (q.v.). In the internal administration of his states, notwithstanding the embarrassed condition of finances produced by the curtailment of his territory, he introduced many ameliorations, and did much for improvement of the city of Rome and of its institutions. In this he was aided by the voluntary contributions of the several churches, as well in special gifts as in the organization of the permanent tribute called Peter's Pence (q.v.). In 1864, on occasion of the centenary of the martyrdom of St. Peter, he brought together at Rome a large assemblage of bishops, and subsequently, on occasion of the canonization of the Jesuit martyrs of Japan

But the most important event of his pontificate was the convocation of the Vatican Council (see COUNCIL), at which bishops from all parts of the Rom. Cath. world assembled 1869, Dec.: for its discussions see POPE. It was adjourned 1870, July, after it had proclaimed the famous decree of the infallibility of the pope, when on a subject of faith or morals he issues a decree *ex cathedrâ* to the universal church. Soon after the adjournment, the Italian army occupied Rome, and declared it the capital of the kingdom of Italy. P. renewed with all solemnity his oft-repeated protest, and refusing an offered dotation, and all other proposals of accommodation, from that date declared himself a captive in the Vatican, to which he strictly confined himself. 1871, June, he completed the 25th year of his pontificate, thus exceeding the term of all previous pontificates except that assigned to St. Peter, and falsifying in his own person the traditional prediction that no pontiff would ever 'see the days of Peter.' His health was for some years precarious; but with occasional interruptions, he continued to attend personally to all public affairs, civil as well as ecclesiastical, of his office.

PIUS X. (GUISUPPE SARTO), Pope of Rome; 1835, June 2 ——; b. in Riese, diocese of Treviso, province of Venice, Italy, of humble origin. He was educated in the Salesian Institute, Cottolengo, and at Padua, and gained the favor of his instructors by his studiousness. On 1858, Sept. 18, he began the work of a parish priest; in 1875 was elected episcopal chancellor; subsequently became spiritual director of the seminary, pro-synodal examiner, member of the ecclesiastical tribunal, and finally vicar of the chapter of Treviso. On 1884, Nov. 10, he was made bishop of Mantua, and on 1893, June 12, cardinal and patriarch of Venice, and titular of the church of St. Bernardo alle Terme in Rome. His preferment was opposed by the Italian government on the ground that the patriarchate was part of the king's patronage. The Vatican denied this claim, and the dispute was ended by virtue of Sarto's personality, for he was on the most friendly terms with the king and queen, and from the latter had accepted special marks of favor. At a later date the patriarch displayed independence by attending a reception at the Quirinal, contrary to the expressed desire of Leo XIII. As cardinal he increased the reputation he already had for piety, learning, and administrative ability. He reformed abuses in the administration of the churches; insisted on the strict observance by the priests of liturgical rules; destroyed relics whose authenticity was doubtful, and therefore was misleading; and patronized the arts liberally, especially music, reviving the Gregorian chant in St. Mark's. He was ranged among the more liberal members of the Italian episcopate, and showed a conciliatory spirit by advocating a union of church and state. Occupied wholly with the duties of his diocease, he seldom visited Rome, and held himself aloof from the projects and intrigues of the Curia. He is said to have been referred to by Leo XIII. as his prob-

able successor, but during the early ballotting in the college of cardinals, 1903, his name was not prominent, Cardinals Rampolla and Vanutelli being the leading candidates, the latter being preferred at the Quirinal. Finally brought forward as a compromise candidate, Sarto was elected pope on the sixth ballot, Aug. 4. The choice was reached by the union of two currents of opinion in the sacred conclave, the one constant in its resistance to the encroachments of the temporal power, the kingdom of Italy, the other seeking some *modus vivendi* by which terms could be arrived at and more amicable understandings had between the Holy See and the State. Sarto's election gave great satisfaction to Austria, which had not favored Rampolla on account of his opposition to the Triple Alliance, and was equally acceptable to Germany and France. Among the first of those of many countries to convey the homage of the nations was a party of American pilgrims. Pius X. was crowned in St. Peter's on Sunday, Aug. 9, with the most impressive ceremonies of the church, these being the first of their kind observed in the edifice since 1846.

PIVOT, n. *pĭv'ŏt* [F. *pivot*, the peg on which a door turns: It. *pivolo*, a peg: mid. L. *pipa*, a pipe: the word has the same derivation as *pipe*, which see]: the point of the pin or axle on which a wheel or body turns; the end of a shaft which rests and turns in a support; a turning-point; the stationary officer or soldier on whom as marking the centre the wheelings are made in the various evolutions: V. to place on a pivot. PIV'OTING, imp. PIV'OTED, pp.: ADJ. furnished with pivots. PIVOT-GUN, a piece of ordnance which turns on a pivot in any direction.

PIX, n., or PYX, n. *pĭks* [L. *pyxis*, a box: Gr. *puxis*, a box; *puxos*, L. *buxus*, box-tree—so called from the density of the wood, Gr. *puknos*, dense]: the box containing the coins selected to be tried by the assay-master in order to prove that they are of the standard purity—the process is called PIXING, n. *pĭks'ĭng;* in the *Rom. Cath. Chh.*, the little box or chest in which the consecrated wafer or host is kept.

PIYÂDASI: one of the names, often in inscriptions, of the celebrated King As'oka: see BUDDHISM: INDIA.

PIZARRO, *pē-zăr'rō*, Sp. *pe-thâr'ro*, FRANCISCO: conqueror of Peru: 1476–1541, June 26; b. Truxillo, Estremadura, Spain; illegitimate son of Gonzalo P., a col. of infantry and a soldier of some distinction. Of his youth, little is known, but it appears that he was wholly neglected by his parents, was taught neither to read nor write, and that his principal occupation was that of a swineherd. Abandoning this uncongenial employment, he sought the port of Seville, and there embarked, to seek fortune in the new world. He was in Hispaniola 1510; later, he joined Balboa, and was with that cavalier when he crossed the Isthmus of Panama and discovered the Pacific. In 1515 he was engaged in traffic with the natives on the shores of the newly-discovered ocean, but was afterward chiefly in

military service, in which he showed great bravery, resouree, and enduranee. About this time, when a fresh and powerful impulse was given to adventure by the splendid achievement of Cortes, rumors of a country far south, in which gold and silver were said to be as abundant as iron in Spain, reached Panama, and kindled P.'s ambition. He formed a sort of copartnery with Diego de Almagro, an adventurer and foundling like himself, and Hernando Luque, an ecclesiastic; and with the funds which the three friends amassed, they were enabled to fit out a small expedition, of which P. took command. 1524, Nov., he set sail southward, but went no further than Quemada Point. Making an agreement (dated 1526, Mar. 10) that all lands, treasures, vassals, etc., that should be discovered were to be equally divided between them, the three friends, P., Almagro, and Luque, organized a second expedition, consisting of two ships, which set sail for the South Seas. Having reached the port of Santa, lat. about 9° s., and having really discovered Peru, P. returned to Panama, carrying with him many beautiful and valuable ornaments in gold and silver, which he had obtained from the friendly and generous natives, as well as specimens of woolen cloths of silky texture and brilliant hue, and some lamas or alpacas. Unable to find in Panama a sufficient number of volunteers for invasion of the newly-discovered country, the indomitable adventurer returned to Spain 1528, narrated the story of his discoveries before Charles V. and his ministers, described the wealth of the territories, and showed, as proof, the gold ornaments and utensils, the manufactures, etc., which he had brought. The result of his representations was, that the right of the discovery and conquest of Peru was secured to him, and honorable titles —among others those of gov. and capt.-gen. of Peru—were conferred on him. On his side, he agreed to raise a certain number of followers, and to send to the crown of Spain a fifth of all the treasures that he should obtain. Returning to Panama, he set sail for Peru for the third and last time, with a well-equipped but small force, not more than 180 men, of whom 27 were cavalry. For the chief events of the conquest of Peru, see PERU: also ALMAGRO: ATAHUALPA. Within ten years, the great *conquistador* made the empire of Peru his own; but he who had surmounted so many stupendous difficulties, who had broken through the lofty barrier of the Andes, and, with his group of followers, been a victor in so many fields, fell a victim to a conspiracy 1541.

P. was a soldier of unflinching courage, inflexible purpose, and unfailing resource; yet his success in Peru appears to have been the result of chance more than of calculation. His boldest stroke was the seizure of the Inca Atahualpa (q.v.), when surrounded by thousands of his followers; but in doing so he deserved credit neither for originality nor for policy; since the idea was borrowed from Cortes, and the step itself was so foolhardy and desperate, that its sueeess ean be regarded only as luek. Although on some oceasions he appears to have been guided

by noble and generous impulses, he was eminently selfish, perfidious, and relentless. His conquest of Peru is a drama in every act of which there is bloodshed; but the drama is at least consistent to the end. P. lived a life of violence, and died a violent and bloody death.

PIZAR'RO, Gonzalo: 1506–1548, Apr. 10; b. Truxillo, Estremadura, Spain; illegitimate son of Col. Gonzalo P. He cast in his fortunes with those of his brother Francisco P. when that leader returned to Spain 1528. He became a soldier at an early age; distinguished himself, before he joined his brother's expedition, by his skill in martial exercises; and when he reached Peru, was esteemed the best lance in the Spanish troop. The territory of Quito was assigned to him by Francisco, and he was enjoined to undertake an exploring expedition to the east, where a land, reputed extremely rich in spices, was said to lie. At the head of 350 Spaniards and a great concourse of Indians, P. set out on his famous journey in the beginning of 1540. Marching e., they reached a country traversed by lofty branches of the Andes. Here the icy winds benumbed the limbs of the adventurers as they rose to the higher plateaux, and, rendered helpless by the cold, many of them sank and died. Descending the e. slopes of the Andes, they reached the 'Land of Cinnamon;' but as they could not transport the trees across the mountains, their discovery was almost valueless. Hearing of a land abounding in gold at the distance of ten days' journey, the leader resolved to reach it. Pushing forward, the Spaniards entered great forests, where often they had to hew a passage with their axes. Their clothes were now torn to shreds, and their provisions had been long exhausted. They killed and ate the dogs they had brought with them, after which they lived on the herbs and dangerous roots of the forest. At length they struck the broad and desolate waters of the Napo, important affluent of the Amazon. On the surface of this broad river no vessel floated, and its course was amid gloomy woods, whose silence was undisturbed except by the sound of the rushing waters. Here P. caused a rude bark to be constructed for transport of the baggage and of the weaker travellers. Francisco de Orellana was intrusted with the command of the vessel. P., hearing of a populous nation at the distance of a few days' journey, who dwelt near the confluence of the Napo with a larger river, sent forward Orellana to obtain and bring back supplies for the starving travellers, who had eaten the last of their horses, and were now reduced to the leather of their saddles and belts. Orellana reached the Amazon; but, unable either to obtain supplies, or to return against the current of the river, abandoned the expedition, and with his 50 followers resolved to sail down the Amazon, reach the Atlantic, and make for Spain. This wonderful design was successfully carried out. P., after waiting in vain for the return of the bark, resolved to return to Quito, which, after enduring terrible sufferings, and seeking fruitlessly for the rich regions of which he had heard so much, he reached 1542,

June, after an absence of more than two years. The fatal character of this expedition may be inferred from the appearance the travellers presented on their return. Half of the 4,000 Indians had perished, and of the Spaniards, only 80 remained; and these, clad in skins, blackened by the sun, and wasted by hunger and fatigue, with long matted locks, seemed like a troop of spectral savages. This expedition stands unmatched in the annals of American discovery for its dangers and sufferings, for the length of their duration, and for the fortitude with which they were endured. For the fate of Gonzalo P., see PERU.

PIZZICATO, *pĭt-sĭ-kâ'tō* [Ital. twitched], abbreviated *Pizz.:* term of direction in music for the violin or violoncello, to denote that the strings, instead of being played as usual by the bow, are to be twitched with the fingers in the manner of a harp or guitar. The P. is much used in accompaniments, as sounds thus produced do not cover the voice; it is used also in symphonic effects. The ordinary mode of playing is restored by the letters *c. a.* (*col arco,* with the bow).

PIZZO, *pĭt'sō:* seaport of s. Italy, 24 m. w.s.w. of Catanzaro. At P., Murat (q.v.) was taken, tried, and shot. Pop. 7,400.

PLACABLE, a. *plā'kă-bl* or *plăk'ă-bl* [L. *placa'bĭlĭs,* easily appeased—from *plāco,* I quiet or soothe: It. *placabile*]: that may be appeased or pacified; willing to forgive; easily reconciled. PLA'CABLY, ad. *-blĭ.* PLA'CABIL'ITY, n. *-bĭl'-ĭ-tĭ,* or PLA'CABLENESS, n. *-bl-nĕs,* the quality of being placable or appeasable.

PLACARD, n. *plăk'ârd* [F. *placard,* a bill posted up—from *plaquer,* to clap on; *plaque,* a plate of metal: Dut. *plakken,* to paste, to daub: Flem. *placke:* Scot. *plack*]: a bill or printed paper stuck up against a wall; a declaration fixed up in some public place; a posting-bill: V. *plă-kârd',* to stick up a written or printed paper on a public place; to cover with bills; to notify publicly. PLACARD'ING, imp. PLACARD'ED, pp.

PLACE, n. *plās* [F. *place*—from L. platēa, a street; Gr. *plateia*, a broad way: It. *piazza;* Ger. *platze;* Sp. *plaza*, a place, a market-place]: situation, site, or spot; a wide street or public square in a city; any portion of space; station or rank; a position occupied and held as a residence; a village, town, or city; occupation or calling; office; lieu or stead room; existence; duty; function; a passage of a writing, ordinal relation, as in the first *place;* position; a fortified town or post; in *OE.*, the pitch of a hawk or other bird of prey: V. to set or fix; to appoint; to settle; to invest. PLAC'ING, imp. PLACED, pp. *plast.* PLACER, n. *plās'cr*, one who places or sets. PLACELESS, a. *plās'lĕs*, without a place; in *politics*, out of office. PLACE'MAN, n. *-măn*, one who holds office under a government; one who fills a public station. TO TAKE PLACE, to happen; to come to pass. TO TAKE THE PLACE OF, to be substituted for. TO GIVE PLACE, to make room or way; to yield precedence. TO HAVE PLACE, to have a station, room, or seat; to have existence. PLACE-BRICKS, the outermost bricks in a clamp or kiln, and only sufficiently burnt on one side. PLACE OF ARMS, in *mil.*, an enlargement of the covered way, where bodies of troops can be formed to act either on the defensive by flanking the covered-way, or on the offensive, by making sorties. HIGH PLACES, in *Scrip.*, an elevation or rising ground encompassed with trees where sacrifices were offered, generally to idols.—SYN. of 'place, n.': space; locality; location; room; passage; effect; existence; rank; priority; precedence; office; way; ground; station; situation; seat; abode; position; site; spot; employment; charge; trust; function.

PLACEBO, n. *plă-sē'bō* [*L.* I shall please]: a prescription, composed usually of indifferent substances, given to satisfy the patient's desire for treatment, when none is really called for. In the Roman Catholic Church, the vesper hymn for the dead.

PLACENTA, n. *plă-sĕn'tă* [L. *placenta*, a cake; Gr. *plakous*, a flat cake—from *plax*, a flat surface]: in *anat.*, the vascular outgrowth from the walls of the uterus, forming the principal medium of communication between the parent and child, and which, being expelled after the birth, is popularly called the *after-birth* (see below): in *bot.*, the part of the carpel bearing the ovules (see below). PLACEN'TAL, a. *-tăl*, pertaining to the placenta: N. a mammal having a placenta. PLACENTARY, a. *plă-sĕn'ter-ĭ*, pertaining to the placenta; same as *placental:* N. in *bot.*, a placenta bearing numerous ovules. PLACENTATION, n. *plăs'ĕn-tā-shŭn*, in *bot.*, the manner in which the seeds are attached to the pericarp. PLAC'ENTIF'EROUS, a. *-tif'cr-ŭs* [L. *fero*, I produce]: bearing or producing a placenta. PLACENTIFORM, a. *plă-sĕn'tĭ-fawrm* [L. *forma*, a shape]: cake shaped.

PLACEN'TA, or AF'TER-BIRTH: temporary organ developed within the uterus during pregnancy, and, as its popular name implies, expelled from the maternal organism shortly after the birth of the child or young animal. It is a spongy vascular mass, existing in some form in all mammals, excepting the *Marsupialia* and *Monotremata*, as an appendage to the fœtal membrane called the *chorion*. In the human subject (fig. 1), it is of considerable size at the period of delivery, being of rounded or oval form, with diameter of 6 or 8 inches, and thickness of somewhat more than an inch. Its outer surface, which, till the period of its detachment and expulsion, is attached to the walls of the uterus, is uniform and level (unless it has been morbidly adherent), being covered by a membrane, shortly to be noticed, called the *decidua serotina;* and on peeling off this membrane, the various lobes of which the P. is composed are apparent. The internal or free surface is smooth and shining, and gives attachment to the umbilical cord or navel-string, which connects it with the fœtus. To render the mode of formation of the P. clear, we must premise that the impregnated ovum, when it reaches the uterus, is invested with an outer membrane, the *chorion*, which forms a shut sac, externally covered with short villi. As the ovum advances in age, these villi diminish in number, until few remain, except at that part of the chorion which is in contact with the uterus; and here, about the second month (in the human subject), they divide into branches, as shown in fig. 2. While these changes are going on in the membrane of the ovum, the uterus also is undergoing modification; and on the nature and extent of these uterine changes the character or type of the P. depends. There

Fig. 1.—Human Placenta (half of it being split in two) and Umbilical Cord.

are two such types, the first of which is represented by the human P., and the latter by that of the pig.

In animals exhibiting the first type of placental struct-

ure, the mucous membrane lining the uterus undergoes a rapid growth and modification of texture, becoming connected with the *membrana decidua*, so called from its being thrown off at each parturition. For brevity it is usually termed the *decidūa*. This decidua is from an early period separable into three portions—the *decidua vera*, or *decidua uteri*, which lines the general cavity of the uterus; the *decidua reflexa*, which immediately invests the ovum; and the *decidua serotina*, which is merely a special development of a part of the decidua vera at the part where the villi of the chorion are becoming converted into the fœtal portion of the placenta. The arrangement of these layers is seen in fig. 2. At first, the villi of the chorion lie loosely in the corresponding depressions of the decidua; but subsequently, the fœtal and maternal structures (the villi and the decidua vera) become closely united, so as to form one

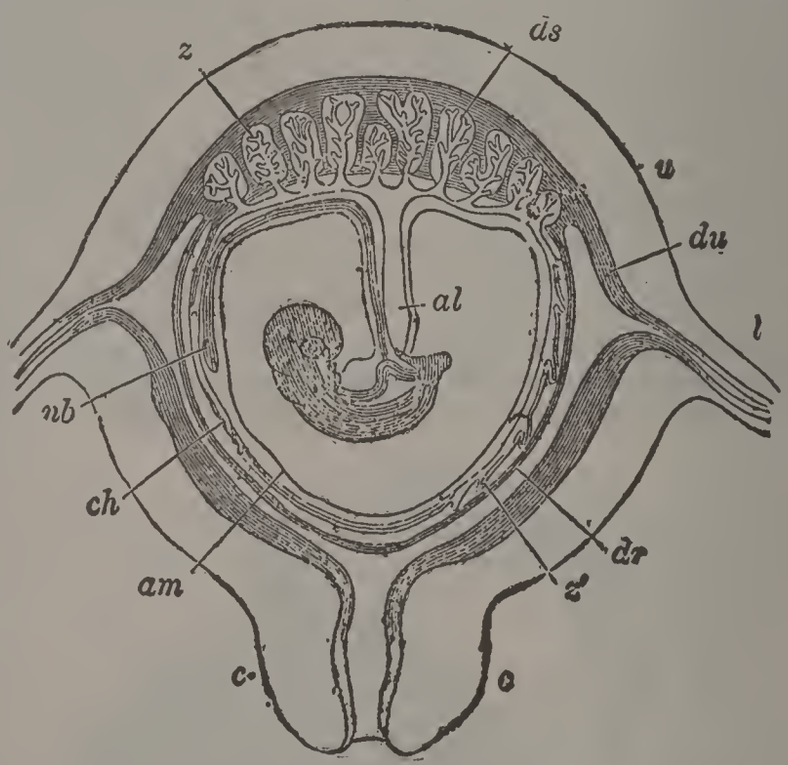


Fig. 2.—Diagrammatic Section of a Human Pregnant Uterus, with the contained Ovum:

u, uterus; *l*, oviduct (or Fallopian tube); *c*, cervix uteri (or neck of the womb); *du*, decidua uteri; *dr*, decidua reflexa; *ds*, decidua serotina; *ch*, chorion; *am*, amnion; *al*, allantois; *nb*, umbilical vesicle; *z*, villi, which form the fœtal part of the placenta; *z'*, villi over the rest of the chorion, which, in the human subject, take no part in the placental function.

inseparable mass, by the following means: the deeper substance of the uterine mucous membrane in the region of the placenta is traversed by vessels which enlarge into what, in the case of the veins, are termed *sinuses*, dip down between the villi so that finally they are completely bound up or covered by the membrane which constitutes the walls of the vessels, this membrane following the contour of all the villi.

The pure maternal blood is conveyed to the placenta

by what are termed, from their tortuous course, the 'curling arteries' of the uterus, and is returned by the large veins termed sinuses. The fetal vessels are bathed in this blood, as the branchiae of aquatic animals are in the water that surrounds them, which enables the fetal blood to exchange its venous character for the arterial, and by which certain nutritious elements of the maternal blood are taken into the system of the fetus. The placenta is also to be regarded as an excretory organ, serving for the removal, through the maternal blood, of the excrementitious matter, whose continued circulation through the blood of the fetus would be prejudicial to the latter. The vascular connection between the fetus

Fig. 3.—Uterus of a Cow in the middle of Pregnancy, laid open; *v*, vagina; *u*, uterus; *ch*, chorion; c^1, uterine cotyledons; c^2, fetal cotyledons.

and the placenta is effected by the umbilical vein (containing arterial blood), and two umbilical arteries (containing venous blood), all of which lie in the umbilical cord which connects the fetus (q.v.) with the placenta.

The placenta may be formed at any point of the uterus but is usually on the left side. Occasionally it is situated partially or entirely over the mouth of the womb (*os uteri*), in which case dangerous flooding takes place previous to or at the period of labor. This condition is known as *placenta praevia*.

Another difficulty arises from retention of the placenta after the birth of the child. In ordinary cases the average interval between the birth of the child and the expulsion of the after-birth is a quarter of an hour. When the expulsion does not take place within an hour

or an hour and a half, the case is regarded as coming under the head of 'retained placenta.' It occurs in about one case in 400. The principal causes of retention are imperfect, insufficient, or irregular contraction of the womb after the birth of the child. In the first of these cases, if the uterus cannot be excited to sufficient action, the placenta must be withdrawn by the introduction of the hand into the uterus.

The placenta acquires its proper character, in the human subject, during the third month, and it subsequently goes on increasing to the full period of gestation. At about the fourth month, the blood, moving through the enlarged uterine vessels, produces a peculiar murmur, which is known as the *placental bruit*, resembling the sound made by blowing gently over the lip of a wide-mouthed phial, and increasing in intensity and strength as pregnancy advances.

In animals exhibiting the second type of placental structure—e. g., the pig—the placenta is comparatively simple in structure. No *decidua* is developed; the elevations and depressions of the unimpregnated uterus simply acquire a greater size and vascularity during pregnancy. and cohere closely with the chorionic villi, which do not become restricted to one spot, but are developed from all parts of the chorion, except its poles, and remain persistent in the broad zone thus formed throughout fetal life. The cohesion of the fetal and maternal placenta, however, is overcome by slight maceration or post-mortem change; and at parturition, the fetal villi are simply drawn out like fingers from a glove, no vascular substance of the mother being thrown off. Huxley applied the term *deciduate* to those animals whose placenta presents the human type, and which throw off a *decidua;* and termed those animals *non-deciduate* in which the placenta is constructed on the same plan as that of the pig.

The placenta is liable to (1) Congestion, ending in the effusion of blood into the substance of the organ on its surfaces, or between the membranes; (2) Inflammation, giving rise to adhesions, or terminating in suppuration, which may occasion very serious constitutional disturbances; (3) Partial or entire hypertrophy or atrophy; (4) Fatty degeneration, affecting its small vessels.

PLACENTA, in Botany: membrane of the interior of the Germen (q.v.) or ovary, to which the ovules are attached either immediately or by Umbilical Cords (q.v.). The placenta appears sometimes as a mere thickening of the walls of the germen. In many cases, it is a more decided projection from the walls of the germen. When thus connected with the walls of the germen, the placenta are described as *parietal* [Lat. *paries,* a wall]. But in some plants the placenta of the different cells of the germen are united together in a column in its axis, and they are then described as *axile.* This distinction is of great importance as characterizing different orders. Parietal pla-

centæ are formed where the edges of carpellary leaves unite; but great difficulty has been experienced by vegetable physiologists in explaining the formation of axile placentæ; some regarding them as also originally formed in this manner, and others as formed in a quite different manner from the axis itself; nor is it impossible that both theories may be correct as to different orders of plants. It is certain that in many cases in which the placentæ appear as axile, they are formed from the edges of the carpellary leaves which fold in to meet in the axis, and form *Dissepiments* (q.v.) between the cells of the germen. The number of placentæ corresponds with the number of carpels in the germen, or appears to be the double of it, each carpel producing two rows of ovules instead of one. See PISTIL.

PLACEN'ZA: see PIACENZA.

PLACER, n. *plă-thĕr'* or *plăs'ĕr* [Sp.]: a gravelly place where gold is found by the side of a river or stream, or in its bed.

PLACID, a. *plăs'ĭd* [F. *placide;* L. *placĭdus*, gentle, calm—from *placēre*, to please: It. *placido*]: gentle; mild; peaceful; calm; serene; tranquil; composed. PLAC'IDLY, ad. *-lĭ*. PLAC'IDNESS, n. *-nĕs*, or PLACIDITY, n. *plă-sĭd'ĭ-tĭ*, unruffled state; mildness; sweetness of disposition.

PLACITUM REGIUM, *plăs'ĭ-tŭm rē'jĭ-ŭm;* called also PLACET, EXEQUATUR, LETTRES PATENTES: act or instrument executed in virtue of the privilege claimed by the govt. in certain kingdoms to exercise a supervision over the communications of the Roman pontiff with the clergy and people of those kingdoms, and to suspend or prevent the publication of any brief, bull, or other papal instrument which may appear to contravene the laws of the kingdom, or to compromise the public interest. The early Christian emperors, it is well known, freely stretched their legislation into the affairs of the church; and one constant cause of conflict between church and state in the mediæval period was the attempt on the part of the sovereigns to control the free intercourse of the pope with the several churches. In the Pragmatic Sanction in France, and in the similar legislation of Spain, Portugal, Sicily, and the Low Countries during the 15th c., the claims of the state on the same head are asserted; and among the so-called 'liberties' of the later Gallican Church was a certain, though not a complete subjection to the state in this particular; but it was in the German states that this claim was most distinctly asserted, and most formally embodied in the constitutional law. The principle on which the Peace of Westphalia, so far as regards its religious provisions, is based, is that the will of the sovereign of the state is supreme and final in all the concerns of religion. *Cujus regio illius et religio* ('Whose the territory, his also the religion'), became the maxim of church govt.; and, of course, within certain limits, the Rom. Cath. sovereigns acted as freely on it as the Protestant. This intermixture of the spiritual and the temporal prevailed especially in

the mixed governments of the ecclesiastical sovereigns of Germany, the prince-bishops of the Rhine; but without the same foundation, the system was carried to its height in Austria under Joseph II. (see FEBRONIANISM: PIUS VI.), the excessive minuteness of whose ecclesiastical ordinances procured for him the sobriquet 'The Sacristan.' Under him, all pontifical bulls, briefs, and constitutions, and all the ordinances of the local bishops, were made subject to imperial censorship, and it was forbidden to publish any of them without its receiving the *placet* of the emperor. The only exception, in the case of pontifical decrees, regarded those emanating from the Roman Penitentiary (q.v.), which, as being of their nature secret, were not held subject to revision. In Prussia, the same law was enforced, also in Baden and Saxony, no less than in the Prot. govts. of Würtemberg, Saxe-Gotha, Saxe-Weimar, etc.

The 'May laws' of the kingdom of Prussia (so-called because they were enacted in May 1873,4,5), called sometimes the 'Falk laws' (from Dr. Paul Ludwig Adalbert Falk, lawyer and Prussian official who introduced them), asserted definitely the right of the state to intervene in installation of bishops, conduct of theological seminaries, discipline of the clergy, and other matters held by the church to be of purely ecclesiastical concernment. In 1876 three priests were fined and imprisoned for withholding absolution from penitents, and several newly-ordained priests were similarly punished for saying their first mass without the *exequatur* of the minister of worship. Bishops were deposed and exiled, and the temporalities of their sees provisionally sequestered. But the political necessities of the govt. after a few years, compelled Prince von Bismarck to come to terms with the Rom. Cath. party, and thereafter the May laws were administered with all possible lenity, and 1883 a bill was passed modifying those laws in several important particulars. The govt. even gave assurances to the Roman court of its willingness to make further concessions, if the church authorities would show a like conciliatory disposition. The govt. gave evidence of its sincere desire to be at peace with the church 1884 by exempting from fine and imprisonment 119 priests in the diocese of Breslau, who had incurred those penalties under the May laws. Further concessions followed 1886. In 1889 the church party were still demanding the rescission of the remainder of the May laws.

PLACK, n. *plăk* [F. *plaque*, a plate of metal—see also PLACARD]: in OE. and Scot., copper coin = $\frac{1}{3}$ part of a penny sterling.

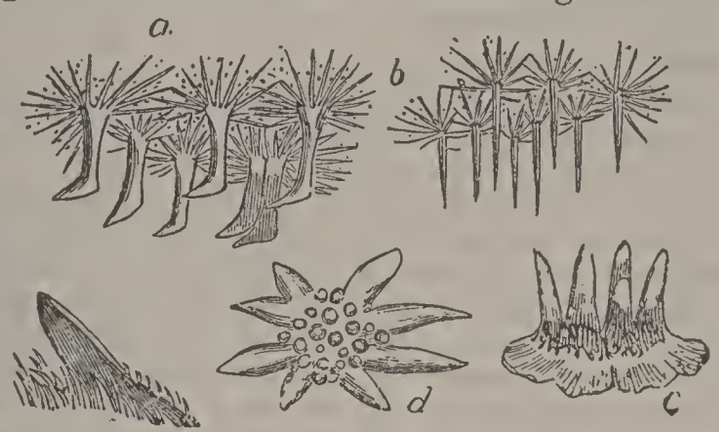
PLACKET, n. *plăk'ĕt* [F. *plaquer*, to clap on]: in *OE.*, a petticoat; a woman's pocket; a woman.

PLACO-, prefix, *plăk-o-* [Gr. *plax, plakos*, anything flat and broad]: flat and broad.

PLACODERMATA, n. plu. *plăk'ō-dėr'mă-tă*, or PLAC'ODERMS, n. plu. *-dėrmz* [Gr. *plax*, or *plăka*, a flat surface; *derma*, skin or covering]: in *geol.*, a term applied to the bony-plated or bone-encased fossil fishes of the Old Red Sandstone.

PLACOGANOID, n. *plăk-ŏg'ă-noyd* [Gr. *plax*, or *plăka*, a flat surface; *ganos*, splendor; *eidos*, appearance]: in *geol.*, a sub-order of the ganoid fossil-fishes, having the head and partly the body protected by large plates, often reticulated.

PLACOID, a. *plăk'oyd*, or PLACOIDEAN, a. *plăk-oy'dē-ăn* [Gr. *plax*, or *plăka*, a flat surface; *eidos*, appearance]: plate-like; having placoid scales like certain fishes. PLAC'OID FISHES, order of fishes, in the classification by Agassiz, characterized by having *placoid* scales, irregular plates of hard bone, not imbricated, but placed near together in the skin. These scales or plates are of considerable size in some fishes, but in others they are very small tubercles, e.g., in the dogfish, of which the skin forms fine-grained shagreen.



Placoid Scales.

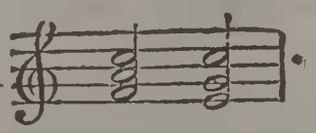
a and *b*, placoid scales of *Aleuteres trossulas*, one of the Balistidæ, from Australia; *c*, *d*, *e*, scales from different parts of the body of *Aleuteres variabilis*.

Agassiz includes among the P. fishes those cartilaginous fishes which have no scales. The order is exclusively of *Cartilaginous Fishes* (q.v.). The existing P. fishes are few in comparison with the fossil genera and species. Placoid scales are often elevated in the middle, the centre sometimes rising into a strongly projecting point or spine. They exhibit great variety of forms, sometimes even in different parts of the same fish.

PLAFOND, n. *pla-fŏnd'* [F. *plat*, flat; *fond*, the bottom, the back]: in *arch.*, the ceiling of a room, whether flat or arched; also the soffit or under side of the corona of a cornice; a soffit generally.

PLAGAL, a. *plā'găl* [Gr. *plāgĭŏs*, oblique, slanting]: in *music*, term applicable principally to *Canto Fermo* (see PLAIN SONG), and signifying collateral. Gregory the Great, in revising the labors of Ambrose, and remodelling the Plain Song (q.v.) of the church, added to the scales of Ambrose, which he distinguished as authentic, certain collateral scales, which he called plagal, possessing the peculiarity of having the octave so divided that the fourth was above the fifth. Melodies are now known as plagal whose prin

cipal notes are contained between the fifth of the key and its octave or twelfth. The cadence, consisting of the sub-dominant harmony followed by the tonic, is called the

plagal cadence— 

PLAGI-, *plā-jĭ-*, prefix [Gr. *plagios*, slanting, oblique]: oblique; the meaning completed by the second element.

PLAGIARIZE, v. *plā'j'ă-rīz* [L. *plagĭārĭus*, a man stealer; *plagium*, kidnapping—from *plaga*, a net: It. *plagiario*, a plagiary: F. *plagiaire*]: to steal from the writings of another; to adopt, without acknowledgment, the writings of another. PLA'GIARIZING, imp. PLA'GIARIZED, pp. *-rīzd*. PLA'GIARISM, n. *-j'ă-rĭzm*, the act of passing off another man's writings, or portions of them, as one's own; literary theft. PLA'GIARIST, n. *-rĭst*, or PLA'GIARY, n. *-rĭ*, one who adopts the writings of another, and offers them to the public as his own; a literary thief.

PLAGIO-: same as PLAGI-.

PLAGIOSTOMA, n. *plā'jĭ-ŏs'tō-mă* [Gr. *plāgĭŏs*, oblique; *stoma*, a mouth]: in *geol.*, a general term applied to certain obliquely oval fossil bivalves of the oyster family. PLAGIOSTOME, n. *plā'jĭ-ŏs-tōm*, one of a group of cartilaginous fishes, including the shark, ray, and the like. PLA'GIOS'TOMI, *-tō-mī*, in the older systems, an order of fishes containing the cartilaginous fishes with Placoid (q.v.) scales, and divided into two sub-orders, one containing sharks, and the other rays. It is now applied sometimes as a sub-class name of the same group. The P. have five or more gill openings. They have no air-bladder. Impregnation takes place before the eggs are deposited, and the males are furnished with *claspers*. PLA'GIOS'TOMOUS, a. *-tō-mŭs*, relating to the plagiostomes.

PLAGIUM, n. *plā'jĭ-ŭm* [L.]: in *law*, the crime of stealing or kidnapping men, women, or children. It was punishable with death.

PLAGUE, n. *plāg* [Dut. *plage*, a wound, affliction: Ger. *plage*, trouble: L. *plāga;* Gr. *plēgē*, a blow—from *plēssein*, to strike: Gael. *plàigh*, a pestilence]: a malignant fever of great virulence, and very fatal; a pestilence, or pestilential disease; anything troublesome or vexatious at the hands of man; any great natural calamity; a state of misery: V. to vex, trouble, or annoy; to afflict with evil of any kind; to perplex; to torture. PLAGUING, imp. *plāg'ĭng*. PLAGUED, pp. *plāgd*. PLAGUY, a. *plāg'ĭ*, vexatious; troublesome. PLAG'UILY, ad. *-lĭ*. PLAGUE-SPOT, a deadly mark or sign; a centre from which moral evil proceeds.—SYN. of 'plague, v.': to vex; torment; distress; tease; annoy; harass; trouble; molest; embarrass; perplex; tantalize; afflict; torture; disturb.

PLAGUE: the pest, the black death; an infectious disease of seven types marked, in its usual form, by hemorrhages into the skin and from the mucous membrane and by swelling of the lymphatic glands, especially those in the groins and axillae. The disease has for some years been epidemic in India, and cases, even small epidemics, are constantly occurring in other parts of the world. At different periods of the 15th, 16th, and 17th centuries it visited w. Europe. It last attacked London and almost all England 1663–65; while so late as 1720 it destroyed nearly half the population of Marseilles; and seventy years afterward prevailed in Russia and Poland, since which time it has been almost unknown in w. Europe.

The disease occurs in three forms—the bubonic, the septicemic, and the pneumonic. The most common form is the bubonic; in this the disease usually commences with a sensation of intense weariness and fatigue, slight shivering, nausea and sickness, confusion of ideas, giddiness, and pain in the loins. These symptoms are rapidly followed by increased mental disturbance, with occasional stupor and delirium, by alternate pallor and flushing of the face, by suffusion of the eyes, and a feeling of constriction in the region of the heart. The temperature rises rapidly to 104° or higher, and the pulse is weak and rapid. Darting pains are felt in the groins, armpits, and other parts of the body, soon followed by enlargements of the lymphatic glands, or buboes (which appear in some cases on the first and second day, in some not till near the close of the disease, and in others are altogether absent), and by the formation of *carbuncles* on various parts of the body. As the disease advances. the tongue becomes dry and brown, while the gums, teeth, and lips are covered with a dark fur; the bowels, at first constipated, become relaxed, the stools being dark, offensive, sometimes bloody. The power of the will on the muscles is much impaired; and altogether the patient resembles a person in intoxication. Throughout the disease there is more or less tendency to faintness; and usually about the second or third day, patechial spots, livid patches like bruise, and dark strips (called *vibices*), appear on the skin, especially in severe cases. These discolorations are due to extravasation of blood, and are often accompanied with hemorrhage discharges from the mucous membranes. In fatal cases the pulse gradually sinks, the surface becomes cold and clammy, blood oozes from the mucous membranes. there is coma, or low delirium; and death occurs usually in five or six days, either without a struggle, or preceded by convulsions. In the septicemic form the germs of the disease swarm in the blood and the patient often dies quickly of the poison before there has been time for the glandular swellings to develop.

In the pneumonic form the symptoms are those of

pneumonia, the incidence of the disease being on the lungs. This is a very fatal form.

There is still another, mild, form called *pestis minor*, which bears the same relation to bubonic plague that varioloid does to smallpox, *i. e.*, its symptoms are slight, the patient often not even taking to the bed, and recovery is the rule, but it is just as infectious as the severer form; the patient with this pestis minor is therefore a greater menace to the community than his sicker brother who cannot move about and spread the disease to new centers.

The cause of plague—of any of its three, or rather four, forms (if we include pestis minor, which differs only in degree from the typical bubonic plague), is a microbe called *Bacillus pestis*. This enters the body chiefly by inoculation through the bites of fleas, though it may also be inhaled, giving rise to the pneumonic form, and may enter the digestive tract with contaminated food. Many of the lower animals, especially rats, suffer from plague, and it is chiefly through the latter that the disease is spread. The agents which convey the bacilli from rats to man are the fleas infesting the former. Little can be done to arrest the disease in any individual case. The patient should, if possible, be removed at once from the source of the disease; he should be exposed freely to fresh air; his secretions should be duly regulated, and his strength supported as far as possible. Phenol, carbolic acid, is said to have given good results in some cases. Serum treatment has given the best results, but that is more efficaceous by way of prevention of the disease in those who have been exposed than in respect of cure of the fully developed disease. But though treatment is comparatively valueless, much may be done toward guarding against the disease.

PLAICE, n., or PLAISE, *plās* [*Dut. platdijs; F. plie; Ger. platteisse*, a plaice—from L. *platessa*, a flat fish], (*Platessa vulgaris*): species of Flounder (q. v.), resembling the common flounder, but rather broader in proportion to it length; the upper surface of the body and the fins olive-brown, marked with large bright orange spots; a row of similar spots on the dorsal fin and on the anal fin; no tubercular asperities on any part of the body, but a curved row of bony tubercles on the eye-side of the head. The plaice inhabits sandy and muddy banks, not in very deep water, and is very abundant on most of the coasts of Europe. Like the common flounder, it often ascends slow rivers to some distance from the sea, and it has even been found to thrive when transferred to fresh-water ponds. It feeds on worms, mollusks, small crustaceans, and young fishes. It has been known to attain the weight of 15 lbs., but a plaice of 7 or 8 lbs. is accounted large. It is taken both by lines and trawl-nets. It is in considerable esteem for the table, though so plentiful as to be very cheap. The

Amer. P. (*Paralichthys dentatus*), called also SUMMER FLOUNDER, TURBOT FLOUNDER, is of a genus represented on the coasts of the Pacific and Indian oceans, but not of Europe. As usual with many fish, it has a great variety of confusing names, e.g. Brail and Puckermouth in R. I., and Deep-sea Flounder in Boston and New York. It resembles young Halibut, and next to Halibut is the most valuable flat-fish on our coast, ranging from Cape Cod to Paraguay; in summer frequenting shallow waters. Its length varies from 16 in. to 3 ft. Immense numbers are taken in s. New England. Four other species, smaller, are found on the Atlantic coast of N. Amer., where also occur 26 species of flat-fish, and nearly as many on the Pacific coast.

PLAID, n. *plăd* or *plād* [Gael. *plaide*, a blanket. comp. Goth. *paida*, a coat]: a long and broad strip of woolen cloth checkered black and white, or in variegated colors, worn loosely as a scarf or shawl over or wrapped around the person; used chiefly by the rural population in Scotland (see TARTAN). PLAID'ING, n. the coarse woolen cloth used for plaids, blankets, etc. PLAIDEN, n. *plăd'ĕn* or *plād'ĕn*, or PLAIDING, n. *plăd'ĭng* or *plād'-*, twilled coarse woolen cloth. PLAIDIE, n. *plād'ĭ*, a little plaid; a plaid.

PLAIN, a. *plān* [F. *plain*—from L. *plānus*, even, level: Sp. *plano*, plain, level]: without ornament or embellishment; homely; artless; frank; sincere; candid; easily understood; not difficult; clear; not luxurious, as in food; smooth, level, or flat: AD. not obscurely; distinctly: N. land approximately level; a flat expanse—extensive plains in Asia are called *Steppes* (q.v.), in Africa *Deserts* (q.v.), in S. Amer. *Pampas* (q.v.), and *Llanos* (q.v.), in N. Amer. in the eastward and central states *Prairies* (q.v.), in the southward states *Savannahs* (q.v.). In Europe, 'plains' denotes specifically the great plains of w. Europe—the region bounded by the Elbe, the Harz Mountains, France, and the sea.—An elevated plain is called a *plateau* or tableland. In *OE.*, PLAIN, v. for COMPLAIN; lament; wail. PLAIN'LY, ad. *-lĭ*, in a plain manner; fairly; clearly; not obscurely. PLAIN'NESS, n. *-nĕs*, quality or state of being plain; levelness; flatness; want of ornament or show; rough sincerity; artlessness. PLAIN-DEALING, a. frank; open; void of art: N. speaking or acting with openness and sincerity; sincerity. PLAIN CHART and PLAIN SAILING: see under PLANE. PLAIN-SPEAKING, n. frankness; candor. PLAIN-SPOKEN, a. rough; speaking with unreserved sincerity. PLAIN WORK, needle-work, as distinguished from embroidery. —SYN. of 'plain, a.': apparent; clear; visible; manifest; obvious; evident; conspicuous; even; level; flat; smooth, open; artless; frank; undisguised; unaffected; candid; honest; sincere; unvarnished; unembellished; ingenuous; simple; distinct; unreserved; downright; unornamental; mere; bare; discernible; intelligible; unobscure; not pretty.

PLAINFIELD: town, Windham co., Conn.; on the New England r.r., 27 m. w. of Providence, R. I. It manufactures cotton and woolen goods, carriages, and bricks. Pop. (1890) 4,582; (1900) 4,821; (1910) 6,719.

PLAINFIELD, *plān'fēld:* city, Union co., N. J.; on the Central railroad of New Jersey, and on Green Brook; 24 m. w.s.w. from New York, about 16 m. s.w. of Newark. There are 14 churches; several schools (one, the first free school opened in the state), an institute, and a seminary; two monthly, two weekly, and two daily papers; a savings bank, and two national banks (cap. $350,000). There are machine-shops and large manufactories of hats and clothing. The surrounding agricultural region is productive, and there are several villages near, with which there is considerable trade. The scenery is pleasing, and the locality is considered very healthful. The place is one of the most attractive suburbs of New York. In 1684 a house was built about two m. from the present site of the city. P. was regularly laid out 1735, and incorporated as a city 1869. Many people doing business in New York reside here. Pop. (1870) 5,095; (1880) 8,125; (1890) 11,267; (1900) 15,369; (1910) 20,550.

PLAIN SONG, or CANTO FERMO, *kăn'tō fĕr'mō* [Ital.] name given by the Church of Rome to the ecclesiastical chant; an extremely simple melody, admitting only notes of equal value, rarely extending beyond the compass of an octave, and never exceeding nine notes, the staff on which the notes are placed consisting of only four lines. The clefs are C and F. St. Ambrose is deemed the inventor or systematizer of Plain Song. His labors consisted in selecting from the extremely complicated system of the Greeks a set of scales sufficiently few and simple for a very rude people. During the two centuries after his death, his institutions fell into confusion. Gregory the Great revived and perfected them, recasting them into an *Antiphony*, or authorized body of ecclesiastical music, and brought Plain-song into the state in which it is yet used in the Roman Church. See AMBROSIAN CHANT: GREGORIAN CHANT.

PLAIN-STANES, n. *plān'stānz* [Eng. *plain;* Scot. *stanes*, stones]: the pavement of a street.

PLAINT, n. *plānt* [F. *plainte*, complaint—from *plaindre*, to pity—from L. *plangĕrĕ*, to bewail]: audible expression of sorrow; lamentation; a memorial tendered to a court of law, in which the person sets forth his cause of action against the offender. PLAINTIFF, n. *plānt'ĭf* [F. *plaintif*, making complaint]: in *law*, person who institutes and maintains a civil action or suit against another called the Defendant. In *Scotland*, a plaintiff is called a Pursuer. In proceedings and applications of a civil nature commenced by petition, the party taking the initiative is called the Petitioner. PLAINT'IVE, a. *-ĭv*, expressing grief or sorrow; touching; sad. PLAINT'IVELY, ad. *-lĭ*. PLAINT'IVENESS, n. *-nĕs*, the quality or state of being plaintive.

PLAIT, n. *plāt* [from Eng. *plight*, a fold, a bending: F. *plier* or *ployer*, to plait, to fold—from L. *plicārĕ*, to fold: W. *plygu*, to double or fold: OF. *ploit*, a plait]: a fold; a double, as of cloth; a braid, as in a lady's hair; the narrow strips of straw-work for making straw hats: V. to fold or double; to double into narrow strips· to interweave; to

braid; to entangle. PLAIT'ING, imp. PLAIT'ED, pp.: ADJ. folded; interwoven. PLAIT'ER, n. *-ėr*, one who plaits: also spelled PLEAT.

PLAN, n. *plăn* [F. *plan*, a plan or scheme—from L. *plānus*, flat, level]: a drawing or representation of anything on a flat surface, as of a building; a sketch; a design; a scheme. The term is applied to all kinds of architectural drawings, but ought to be limited to those representing the horizontal sections of the various floors of buildings. Plans show the disposition of the apartments and walls, with situation of fireplaces, closets, doors, windows, stairs, etc.; they, in fact, represent the different stories as they appear successively from above, when the walls are built two or three ft. above the level of each floor: V. to form a sketch or representation of any intended work on a flat surface; to devise or scheme. PLAN'NING, imp. scheming; devising. PLANNED, pp. *plănd:* ADJ. devised. PLAN'NER, n. *-ėr*, one who plans.—SYN. of 'plan, n.': design; scheme; project; draught: delineation; outline; sketch; plot; contrivance; device; diagram; form.

PLANARIA, *plă-nā'rĭ-a:* name of flat-worms of the ord. *Turbellaria*, class *Platyhelminthes*. They much resemble the flukes (e.g., the liver-fluke), but are not parasitic, except several species that infest echinoderms. A common species is the dark brown *P. torva*, ¼ to ⅜ in. long. The white semi-transparent *Dendrocœlum lacteum* lives under stones and sticks in ponds, and its branching alimentary tube, easily seen, is characteristic of one suborder. Most of the P. have the remarkable power of projecting missiles from their skin—minute, stiff rods, which, by trial with a Ceylonese species, were found to irritate the experimenter's tongue. A U. S. land-planarian is *Rhyncodesmus sylvaticus*. The species are numerous. Some inhabit fresh, others salt water; some, the land. They are generally found creeping among confervæ, or on stems of plants. Many larger marine species swim freely by flappings of the broad margins of their bodies. Two specks in the fore-part of the body of many species have been supposed to be eyes; but there is no proof of it. Planarians are hermaphrodite, but copulate for mutual impregnation. Their power of multiplication by self-division is very great; and if an individual be cut in pieces, each piece continues to live and feel, and 'even if it be the end of the tail, as soon as the first moment of pain and irritation has passed, begins to move in the same direction as that in which the entire animal was advancing, as if the body was actuated throughout by the same impulse; and, moreover, every division, even if it is not more than the eighth or tenth part of the creature, will become complete and perfect in all its organs.'—*Rymer Jones.*

PLANCH, v. *plănsh* [F. *planche*, a plank—from mid. L. *planca*]: in *OE.*, to cover over with boards or planks; to patch. PLANCH'ING, imp.: N. wooden flooring. PLANCHED, pp. *plănsht:* ADJ. made of boards. PLANCH'ER, n. *-ėr*, a floor of wood.

PLANCHET, n. *plăntsh'ĕt* [F. *planchette*, a little board—from *planche*, a plank (see PLANK)]: a flat piece of metal prepared to be made into coin. PLANCHETTE, n. *plăng-shĕt* [F.]: curious toy of French invention, to which some believers in spiritualism have ascribed the power of returning answers from the spirit-world. It consists of a heart-shaped board seven or eight inches at its greatest breadth and length, mounted on two pentagraph wheels, about two inches high, at its widest part, while a pencil fastened at the apex forms its third support. Placed upon a table with a sheet of paper under it, and one or two persons with the necessary qualifications having their hands upon its tablet, setting it in motion, it is found, through marks by its pencil, to return answers to questions sometimes puzzling.

PLANE, a. *plān* [L. *plānus*, level (see PLAIN)]: level; flat; even; without elevations or depressions, as the surface of water at rest; opposed to a *curved surface:* N. an even or level surface; in *geom.*, a surface without curvature (see below): an imaginary surface assumed to cut and pass through a body, or one of the supposed curves of the celestial sphere; in *surv.*, a level surface parallel to the horizon; tool for smoothing wood (see below): V. to make level or smooth as with a carpenter's *plane;* to free from inequalities of surface. PLAN'ING, imp. PLANED, pp. *plānd*. PLANER, n. *plān'ĕr*, in *printing*, a flat piece of wood used by the compositor to make the surface of the type in the form quite level. PLANE GEOMETRY, the geometry that regards plane figures or surfaces only. PLANE TRIGONOMETRY regards the measurement of plane angles. PLANE ANGLE, an angle contained by two straight lines or surfaces. PLANE CHART, a chart constructed on the supposition that the earth is an extended flat surface. PLANE IRON, the cutting-iron inserted in a carpenter's plane. PLANE of DEFILADE, in *fort.*, a plane supposed to pass through the crest of a work parallel to the plane of sight. PLANE OF SIGHT, the general level of the ground on which a work is constructed, whether horizontal or inclined to the horizon. PLANE SAILING, the method of solving, or partially solving, problems in navigation, on the supposition that the path of the ship is described on a plane surface—opposed to *spherical sailing*, which takes account of the true form of the earth's surface. PLANE-TABLE, in *surv.*, an instrument or board for drawing plans on the field.

PLANE: tool for rendering the surface of wood smooth and level. It consists of an oblong block of wood or metal, with an opening through the centre; this opening is square on the upper side, and is always large enough to admit the cutting instrument; it diminishes down to a mere slit on the under side, just wide enough to allow the cutting edge of the plane-iron and the shaving of wood which it cuts off to pass through. The form of this opening will be seen at *a*, fig. 1, which represents the section of a common jack-plane. The essential part of the tool is the plane-iron, a piece of steel with a chisel-shaped edge, and a slot in its centre for a large-headed screw to work and to attach to it

a strengthening plate. Fig. 2 shows the plate-iron, and fig. 3 the same with the strengthening plate attached; these are shown in their proper position at *bd* in the section fig. 1, and they are held in place by the hard-wood wedge (fig. 4), seen also in the section at *c*. By driving in the

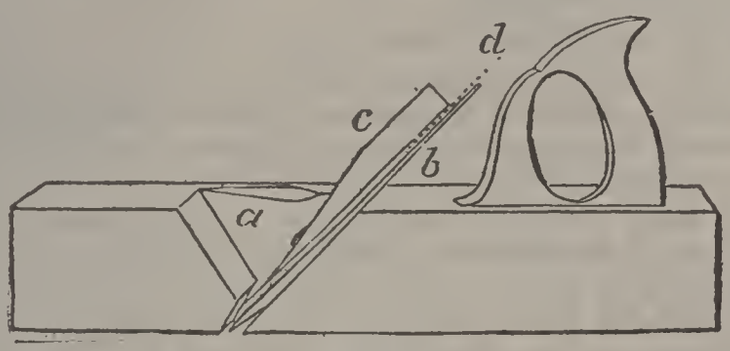
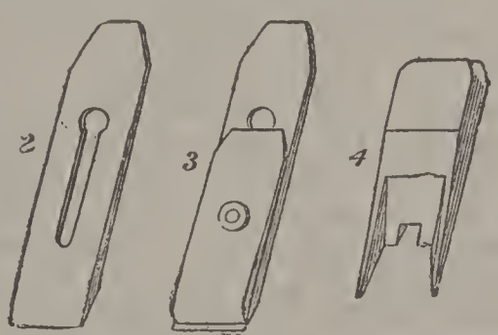


Fig. 1.

wedge, the irons are held very firmly in their place, and they are so adjusted that only the fine sharp chisel-edge of the cutting-tool projects through the slit in the bottom of the body of the plane, so that when the tool is pushed forward by the force of the hand, the cutting edge pares off all irregularities, until the wood is as smooth as the under



surface of the plane. There are many modifications in this tool, which can have its cutting edge and under surface made to almost any contour, so that moldings of all kinds may be made. The two commonest are the jack-plane for rough work, and the smoothing-plane for finishing off plane surfaces.

PLANING-MACHINES have come largely into use, by which both wood and metal are planed. In those intended for wood, the cutting instruments are moved forward over the wood by machinery in the same manner as in the hand-plane. The precision and rapidity with which these machines work have given great facilities for building, as one machine will do as much work as 60 men. The planing machines for metal are different in principle. A well-tempered, chisel-edged steel cutter is held in a fixed position, pressing downward upon the metal plate, which is moved forward by powerful machinery. The action of this movement is, that a groove is plowed into the metal of the size of the steel cutter; when the metal has travelled its full length, and has made the groove complete, the downward pressure of the tool is removed, and by the action of the

double screw which has carried it forward, it is returned, and readjusted for another groove to be formed by the side of the first; and this is repeated until the whole surface of the plate is reduced to the required level. However tedious this process may appear, it offers facilities for metal working previously unknown.

PLANE: see PLANE-TREE.

PLANE, in Geometry: a surface without curvature, whose test is, that any two points whatever being taken in the surface, the straight line which joins them lies wholly in the surface. When two planes cross or intersect one another, their common section is a straight line; and the inclination of the planes to each other is measured by taking any point in their common section, and drawing from it two straight lines, one in each plane, perpendicular to the common section; the angle contained by these lines is the angle of inclination of the planes. When the angle is a right angle, the planes are perpendicular to each other.

PLANER-TREE, *plā'nêr-trē* (*Planera*) : genus of trees with small elm-like leaves, with which the small axillary flowers come forth; stamens 4–5, styles 2; fruit ovoid, nut-like, not winged. In our species (*P. aquatica*) the fruit is stalked in the 4–5-cleft calyx, and has rough projections. It grows in wet banks in Ky. and southward. It follows the elms and precedes the Hackberry in the sub-family *Ulmaceæ*, Elm family, in the *Urticaceæ*.

PLANET, n. *plăn'ĕt* [Sp. *planeta;* F. *planète;* L. *planēta*, a wandering star: Gr. *planētēs*—from *plan'aō*, I cause to wander]: one of the globes in the solar system, moving round the sun like our earth (see below). PLANETARY, a. *plăn'ĕt-ĕr-ĭ*, pertaining to the planets; consisting of or produced by planets; revolving or erratic. PLANETARIUM, n. *plăn'ĕt-ā'rĭ-ŭm* (see below). PLANETOIDS, n. plu. *plăn'ĕt-oydz* [Gr. *eidos*, resemblance], (see below). PLANET-STRUCK or -STRICKEN, a. affected by the influence of planets, as was believed of old; blasted. PLANET-WHEEL, a wheel revolving around or within the circumference of another, by which it is kept in motion.

PLAN'ET, INTRAMERCURIAL: supposed planet between Mercury and the sun. Recent observations during solar eclipses fail to confirm the supposition, and therefore discredit a former announcement in its favor.

PLANETA, *plā-nē'tâ:* Greek name of the vestment called by the Latins Casula, and in English 'Chasuble,' worn by priests in the celebration of mass. The form of this vestment in the modern Roman Church differs both from the ancient form and from that in the Greek Church. The change appears to date from the 9th c., but has been gradual. A certain modification of the Roman planeta was recently introduced in England under the inspiration of Pugin, the great reviver of Gothic architecture and ecclesiastical costume and decoration. But its use has been only partial even in England.

PLANETARIUM, *plăn-ē-tā′rĭ-ŭm:* machine much employed by astronomers in the 17th and 18th c., and constructed first by Huyghens and Römer, for exhibiting the motion of the heavenly bodies in conformity with the Copernican doctrine. The P. exhibited only the orbital motions of the planets about the sun, either in circles or ellipses, and with constant or varying motions, according to the perfection of the machine. It was subsequently supplemented by the *combined tellurian and lunarian*, which exhibited at one and the same time the motion of the moon about the earth and that of the latter round the sun, with the principal phenomena (such as the succession of day and night, the varying length of each, eclipses, and the motion of the moon's apogee and nodes). The old P. was superseded by the Orrery (q.v.). The most perfect apparatus of this kind, exhibited by Perini in London 1880, occupies a pillared chamber with a hemispherical dome, and displays the solar system with the proper movements of the various members at proportionate velocities.

PLANETOIDS, *plăn′ĕ-toydz*, or As′TEROIDS: numerous very small planets grouped in the solar system between Mars and Jupiter. Till the 19th c. they remained undiscovered; though for some years their existence had been suspected, mainly from the remarkable hiatus in the series of the planetary distances when compared with the law of Bode (q.v.). On the first day of the 19th c. the first of them was detected by Piazzi of Palermo, and his success roused astronomers to search for more. Olbers (q.v.) discovered two 1802 and '07, and Harding one 1804; but as all researches for some time subsequent to 1807 were unavailing astronomers gradually came to the belief that no more planetoids remained to be discovered, when the detection of a fifth by Hencke 1845, revived the search, and almost every year since has added to the list. The number now known is more than 500. This remarkable success of the astronomers of our time is due to the systematic manner in which the zodiacal belt has been explored, and the place and apparent size of every star of this region distinctly determined; so that the presence of a wandering body can at once be detected; due also to progress of photography.

The magnitudes of these bodies have not been accurately ascertained, but it is certain that they are exceedingly small as compared even with Mercury, the least of the other planets; the diameter of the largest among them being generally believed not to exceed 450 m., while most of the others are very much smaller than this. They in general differ from the rest of the planets in other respects; their orbits are of greater eccentricity, are inclined to the ecliptic at a greater angle, and are interlaced in a most intricate manner, crossing each other so frequently as to form, viewed perpendicularly, a kind of network. The consequence of this is, that a planetoid, nearest the sun at one part of its orbit, is, when at another

part of its orbit, further from it than are several of the others, and a mutual eclipsing of the sun at different periods by two planetoids must be very frequent. Of the planetoids, of which the elements had in 1884 been satisfactorily calculated, Eros (No. 433) has the shortest period of revolution, 643.1 days, and Thule (No. 279) the longest, 3,287 days. The corresponding mean distances from the sun, expressed in parts of the earth's mean distance, are respectively 1.457 and 4.30. Till 1876, the extremes known in this respect were Flora and Sylvia respectively. The nearest approach to the sun is made by Eros (perihelion distance, 1.126). Eros approaches the earth nearer than any other heavenly body except the moon, its least distance from the earth being about 13,500,000 miles. After the first two or three of these bodies had been discovered, the opinion was propounded by Olbers that they were but the fragments of some large planet; and this hypothesis received corroboration from the intimate connection shown to subsist among them; but of late years it has fallen out of favor with astronomers.

Plane-tree (*Platanus orientalis*).

Some infer that the P. are accounted for best by the nebular hypothesis. It has been calculated that the combined mass of all the P. cannot exceed one-fourth of the earth's mass and of those so far discovered not more than $\frac{1}{1000}$ of the earth's mass.—The number of known P.—(1877) 240—amounted 1890, Oct. 5, to 300; 1896, Dec, 423; during one year 15 were found by Charlois. The rate of discovery has for several years averaged about 10 P. per year, amounting in 1907 to more than 500.

PLANE-TREE, n. *plān'-trē* [F. *plane;* L. *plăt'ănus,* a

plane-tree: Gr. *plat'anos*—from *platus*, broad]: large tree so named from its broad-spreading leaves. The plane (*Platanus*) is the sole genus of trees of nat. order *Platanaceæ*. The flowers are in globose, small, pendulous, long-stalked catkins, which give the tree a peculiar appearance in winter; the ovary is one-celled, and contains one or two pendulous ovules. The species are few; natives of temperate climates in the n. hemisphere; tall trees, with deciduous large leaves, and smooth whitish bark annually scaling off in large pieces.—The ORIENTAL P. (*P. orientalis*), native of Greece and the East, was planted by the Greeks and Romans as an ornamental tree, no other tree, indeed, commanding equal admiration; and for centuries the youth of Greece assembled under its shade in the groves of Academus to receive lessons in philosophy. The P. is still planted for shade and ornament in s. Europe. Many fine trees exist in England, but they were formerly much more numerous, many having died in the end of the 18th c. No tree better endures the atmosphere of a large city, and there are no finer trees in London than its plane-trees. In the East the P. attains immense size: one in the meadow of Buyukdereh on the banks of the Bosporus, is 141 ft. in circumference at the base, extends its branches 45 ft. from the trunk, and is believed to be more than 2,000 years old. The wood of the P., when young, is yellowish-white; when old, it is brownish, fine grained, takes high polish, and is esteemed for cabinet-making. A rich alluvial soil and the vicinity of water are most suitable to this tree.—The NORTH AMERICAN PLANE, BUTTONWOOD, or SYCAMORE (*P. occidentalis*), is very similar. It is the largest deciduous tree of the United States, and abounds on the banks of the great rivers of the middle states. Its timber is not very valuable, and is very liable to decay. A tree of this species on the bank of the Thames, in Chelsea Hospital gardens, is 115 ft. high, with a trunk five ft. in diameter.

PLANETS [Gr. *planētes*, 'a wanderer']: those heavenly bodies (including the Earth) which belong to our solar system, and revolve in elliptic orbits round the sun. They are often denominated *primary planets*, to distinguish them from their moons or satellites, which are called *secondary planets*. The name planet is of considerable antiquity, and was applied to these dependents of the sun to distinguish them from the myriads of luminous bodies which stud the sky, and which present to the naked eye no indication of change of place (see STARS). The planets at present known are, in the order of their distance from the sun, Mercury, Venus, the Earth, Mars, the Planetoids (q.v.), Jupiter, Saturn, Uranus, and Neptune. Six of these, Mercury, Venus, the Earth (not then reckoned a planet), Mars, Jupiter, and Saturn, were known to the ancients; Uranus was discovered by Sir William Herschel (q.v.) 1781; and Neptune, after having its position and elements determined theoretically by Leverrier and Adams, was discovered by Challis, and afterward

by Dr. Galle, 1846. The Planetoids, of which more than 500 are now known, all have been discovered during the 19th c. Five of the planets, the Earth, Jupiter, Saturn, Uranus, and Neptune, are attended by one or more satellites; Uranus (usually), Neptune, almost all the Planetoids, and all the satellites except the Moon, are invisible to the naked eye. The visible planets can be at once disguished from the fixed stars by their clear steady light, while the latter have a sparkling or twinkling appearance. The comparative proximity of the planets may be proved by examining them through a telescope of moderate power, when they appear as round luminous disks, while the fixed stars exhibit no increase of magnitude. The planets, as observed from the Earth, move sometimes from w. to e., sometimes from e. to w., and for some time remain stationary at the point where progression ends and retrogression commences. This irregularity in their movements was very puzzling to the ancient astronomers, who invented various hypotheses to account for it: see PTOLEMAIC SYSTEM: EPICYCLE. The system of Copernicus, by assuming the sun, and not the Earth, as the centre of the system, explained with admirable simplicity what was before a maze of confusion.

The planetary orbits differ considerably in their degrees of eccentricity, the Planetoids, Mars, and Mercury being most, and the larger planets least eccentric. No two planets move exactly in the same plane, though, as a general rule, the planes of the larger planets most nearly coincide with that of the ecliptic. The larger planets are consequently found always within a small strip of the heavens on both sides of the ecliptic; while the smaller have a far wider range, Pallas, one of them, having the angular elevation of its orbit no less than 34° 42″ above the ecliptic. According to Kepler's (q.v.) Laws, the nearer a planet is to the sun the shorter the time of its revolution. The arrangement of the planets in the solar system bears no known relation to their relative size or weight, for though Mercury, Venus, and the Earth follow the same order in size and in distance from the sun, yet Mars, though further from the sun, is much less in size than either the Earth or Venus, and the Planetoids, still further away, are the least of all. Jupiter, which is next in order, is by far the largest, being about 1½ times as large as all the others together; and further outward, the planets become smaller and smaller, Saturn being less than Jupiter, Uranus than Saturn, and Neptune than Uranus.

With reference to their distance from the sun, as compared with that of the Earth, the planets are divided into *superior* and *inferior;* Mercury and Venus are consequently the only 'inferior' planets, i.e., nearer the sun; all the others being 'superior.' The inferior planets must always be on the same side of the Earth as the sun is, and can never be above the horizon of any place (not in a very high latitude) at midnight; they are always

COMPARATIVE SIZES OF THE PLANETS.

invisible at their superior and inferior conjunctions, except when, at the latter, a *transit* (see SUN) takes place. The superior planets likewise are invisible at conjunction, but when in opposition they are seen with the greatest distinctness, being then due south at midnight. The time which elapses from one conjunction to its corresponding conjunction is called the *synodic period* of a planet, and in the case of the inferior planets must always be greater than the true period of revolution.

Mercury, the planet nearest the sun, is also, except the Planetoids, the smallest (being only 3 times the size of the Moon), and performs its revolution round the sun in the shortest time. Its greatest elongation is never more than 28° 45′, and consequently it is never above the horizon more than two hours after sunset, or the same time before sunrise; on this account, and from its small apparent size (5″ to 13″), it is seldom distinctly observable by the naked eye. It shines with a peculiarly vivid white or rose-colored light, and exhibits no spots.

Venus, next in order of distance and period, is to us the most brilliant of all. Its orbit is more nearly a circle than any of the others; and at its inferior conjunction it approaches nearer the Earth than any other planet. Its apparent angular dimensions thence vary from 11″ at the superior to 67″ at the inferior conjunction. Its greatest elongation varies from 45° to 47° 12′, and therefore it can never be above the horizon much longer than three hours after sunset, or the same time before sunrise. While moving from the inferior to the superior conjunction, Venus is a *morning star;* and during the other half of its synodic period, an *evening star.* When this planet is at an elongation of 40°, its brilliancy is greatest, far surpassing that of the other planets, and rendering a minute examination through the telescope impossible. At this period it sometimes becomes visible in the daytime, and after sunset is so bright as to throw a distinct shadow. Astronomers have repeatedly attempted to ascertain the nature and characteristics of its surface, but its brightness so dazzles the eyes as to render the correctness of their observations at best doubtful. From the changes in the position of dusky patches on its surface, which have been frequently noticed, it is concluded that it revolves on its axis, and that its equator is inclined to the plane of its orbit at an angle of 75°; but many astronomers doubt these conclusions. Both Venus and Mercury necessarily exhibit phases like the Moon. For *transits* of Venus, see SUN.

The *Earth*, the next planet in order (see EARTH, THE), has a single satellite, the *Moon* (q.v.).

Mars, nearest of the superior planets, is much inferior in size to the two previous, its volume being about $\frac{1}{7}$ of the Earth's; and, after Mercury, its orbit is much more eccentric than those of the other planets. When it is nearest to the Earth (i.e., in opposition), its apparent angular diameter is 24″.5; when furthest from it (i.e., in conjunc-

tion), not more than 4″. Mars revolves on its axis (inclined at an angle of 24° 50″) in 24 hours 37 minutes, and its year is 687 days long. In 1877 Hall of Washington discovered that it had two extremely small satellites. It shines with fiery red light, and is a brilliant object in the heavens at midnight when near opposition; when seen through the telescope its surface appears covered with irregular blotches, some of reddish, others of greenish color, while at each pole is a spot of dazzling white. The red spots are surmised to be land; the green, water; while the white spots at the poles are with some reason supposed to be snow, since they decrease when most exposed to sun, and increase under the contrary circumstances. The Phases (q.v.) of Mars range between full, half, full (in conjunction, if visible), and half. 40 yrs. ago Proctor mapped the surface of Mars, according to the keen-eyed observations of Dawes, the supposed land reddish, the oceans blue, as they appear telescopically; both features of limited extent, with long, finger-like straits, mostly connecting the polar seas. In 1877 the exceptionally clear skies of Italy and Schiaparelli's remarkable acuteness of vision astonished the world by the revelation of a network of lines, mostly straight and many of them doubled by a parallel line, all over the disk, between the polar seas. With no theory, they were called 'canals.' They seem to be 75–80 m. wide, some of them 3,000 m. long, and the distance between the parallel lines 250–500 m. They are found to be somewhat variable, perhaps owing to the atmospheric conditions of Mars. The observations have been confirmed by some other astronomers. Thus far the phenomena are an unexplained puzzle of extraordinary interest.

The Planetoids.—After Mars in order come the *Planetoids* (q.v.), frequently but improperly called Asteroids.

Jupiter, next in order, is the largest of all the planets, its bulk being more than 1,300 times that of the Earth, though, from its small density, its mass is only 317 times that of the earth. After Venus it is brighest of the planets and largest in apparent size, its angular diameter varying from 32″ to 50″. Seen through a telescope, it is seen to be considerably flattened at the poles, from its rapid revolution on its axis; and its surface is crossed in a direction parallel to its equator by three or four distinct and strongly marked belts, and a few others of varying nature. Spots also appear and remain some time on its surface, by means of which its revolution on its axis has been ascertained to be 9^h 55^m. This planet is attended by seven satellites, four of which are easily observable through an ordinary telescope, and have rendered immense service in determination of longitude at sea, and of the motion and velocity of light. The satellites, discovered by Galileo, were proved by Sir William Herschel to revolve on their own axes in the same time that they revolve round their primary. The largest four have diameters of 3,550 miles, 2,960 miles, 2,500 miles, and 2,100 miles.

The diameters of the other three are exceedingly small, supposed to range from 100 to 30 miles.

Saturn, next in position, is about 768 times larger in volume than the Earth, though only about 95 times greater in mass. Its apparent diameter when in opposition is 18″, and there is considerable flattening toward the poles. Its surface is traversed by dusky belts much less distinctly marked than those of Jupiter, owing doubtless in great part to its inferior brightness; its general color is dull white or yellowish, but the shaded portions, when seen distinctly, are of glaucous color. The most remarkable peculiarity of Saturn is its ring, or series of concentric rings, each parallel and in the same plane with the others and with the planets' equator; the rings are at present supposed to be three in number: the two outermost are bright like the planet itself, while the innermost is of purplish color, and discernible only through a powerful telescope. The rings are not always visible when Saturn is in the 'opposite' half of its orbit, for when the plane of the rings is intermediate between that of the Earth's orbit and of the ecliptic, their dark surface is turned toward us, and when the sun is in their plane only the narrow edge is illumined; in both these cases the ring is invisible from the Earth. Its plane being inclined at an angle of 28° to the ecliptic, the two surfaces of the ring are seen alternately for periods of 15 years at a time; and at the middle of each period, the rings attain their maximum obliquity to the ecliptic, and are then best seen from the Earth: at the end of each period they become invisible. Saturn has no less than ten satellites, seven of which revolve round it in orbits little removed from the plane of the ring, while the eighth, which is second in size, is considerably inclined to it. Two of the satellites were discovered by Herschel 1787 and '89, four by Cassini 1672 and '84, one by Huyghens 1655, one by Lassell in England and Prof. Bond of Harvard Observatory 1848, two by Prof. Pickering of Harvard Observatory in 1899 and 1905. The satellites all are outside of the ring, and the largest of them is nearly equal to the planet Mars in size.

Uranus, next in position, was discovered accidentally by the elder Herschel 1781, Mar. 13, and was named 'the Georgium Sidus' and 'Herschel,' which names soon fell into disuse. It is about 65 (some astronomers say 47) times greater than the Earth in volume, and 15 times in mass; but though so large, its distance is so much greater in proportion, that astronomers have been unable to gain much information concerning it. Faint spots or belts have been discovered on its surface; but are so indistinct that the time of rotation and the position of its axis are practically unknown. It is attended by four satellites, but so minute do these bodies appear, that astronomers were long to agree as to their exact number; Sir William Herschel reckoned six, while other astronomers believed in the existence of four, five, and eight respectively. That there are at least four is without doubt.

Neptune, next and outermost member of the solar system nearly 3,000 millions of miles from the centre of the system, slowly performs its revolution round the sun, accomplishing the complete circuit in about 165 solar years. It is about 84 times larger than the Earth, but from its extreme remoteness is of almost inappreciable magnitude when seen through an ordinary telescope. It was the disturbance in the motion of Uranus caused by the attractive force of this planet which led Leverrier and Adams to a calculation of its size and position, on the supposition of its existence; and the directions given by Leverrier to Dr. Galla of Berlin, specifying its exact position in the heavens, led that astronomer to its discovery 1846, Sep. 23. Lassell of Liverpool has discovered that Neptune is attended by one satellite. The satellites of Uranus and Neptune differ from the other planets, primary and secondary in the direction of their motion, which is from e. to w., and in the case of the former, in planes nearly perpendicular to the ecliptic. Both Uranus and Neptune were observed long before the times of Herschel and Leverrier, but were always supposed to be stars. Uranus is known to have been observed by Flamsteed between 1690 and 1715, and Neptune by Lalande 1795.

In astronomical tables, almanacs, etc., the planets are for convenience denoted by symbols instead of their names.

For a Table of the periods, distances, size, density, etc., of the planets, see SOLAR SYSTEM.

PLANGENT, a. *plăn′jĕnt* [L. *plangens* or *plangen′tem*, striking or beating with a noise—from *plango*, I strike]: dashing or beating, as a wave.

PLANI-, prefix, *plā-nĭ-* [L. *planus*, plain, level, plane]: prefix attaching the qualification of levelness, flatness, or hardness, to the second element of the word.

PLANIMETER, n. *pla-nĭm′ĕ-tėr* [Eng. *plane*, and *meter*]: an instrument for ascertaining the contents of irregular plane figures; a platometer. PLANIMETRY, n. *pla-nĭm′ĕ-trĭ*, the mensuration of plane surfaces. PLANIMETRIC, a. *plăn′ĭ-mĕt′rĭk*, or PLAN′IMET′RICAL, a. *-rĭ-kăl*, pertaining to the mensuration of plane surfaces. The planimeter is used by surveyors for measuring maps, etc. The first practical planimeter was constructed by a Bavarian engineer named Hermann about 1814; this was followed in 1827 by the invention of Opikoffer, a Swiss; 10 years later by the Amsler, and subsequently by the 'Wetlische Linearplanimeter.'

PLANISH, v. *plăn′ĭsh* [L. *plānus*, level, flat]: to polish a metallic surface by gentle and equal blows with a smooth faced hammer; to smooth wood. PLAN′ISHING, imp. PLAN′ISHED, pp. *-ĭsht*. PLAN′ISHER, n. *-ėr*, a tool used by turners for smoothing brass-work; a workman who planishes.

PLANISPHERE, n. *plăn′ĭ-sfēr* [L. *plānus*, flat; Gr. *sphaira*, a sphere]: a sphere or globe projected on a plane surface; a map exhibiting the circles of a sphere.

AMERICAN POISONOUS PLANTS.

1. Poison Ivy (*Rhus radicans*); *a*, spray showing aerial rootlets and leaves; *b* fruit.
2. Poison Hemlock (*Conium maculatum*) showing flowers and seed.
3. Water Hemlock (*Circuta maculata*), showing section of spindle-shaped root and lower stem, the leaves, flowers, and fruit.
4. Pokeweed (*Phytolacca decandra*).
5. Stemless Loco-weed (*Aragallus lambertii*), in flower.
6. Broad-leaf Laurel (*Kalmia latifolia*); *a* flowering spray; *b*, vertical section of flower showing peculiar attachment of stamens (enlarged); *c*, fruiting capsules.
7. Poison Sumac (*Rhus vernix*), showing leaves and fruit.
8. Jimson-weed (*Datura stramonium*); *a*, flowering spray; *b*, fruiting capsule.
9. Wooly Loco-weed (*Astragalus mollissimus*).

PLANK, n. *plăngk* [F. *planche;* Ger. *planke;* mid. L. *planca,* a plank—from Gr. *plax,* anything flat and broad]: a flat piece of sawn timber of some length, differing from boards in being thicker: V. to cover or lay with planks; *familiarly,* to conceal. PLANK'ING, imp.: N. a number of planks. PLANKED, pp. *plăngkt.*

PLANO-: same as PLANI-.

PLANO-CONCAVE, a. *plā'nō-kŏn'kāv* [L. *plānus,* level; *concăvus,* hollowed out]: flat on one side and hollow on the other. PLANO-CONICAL, a. flat on one side and conical on the other. PLANO-CONVEX, a. flat on one side and rounded on the other. PLANO-SUBULATE, a. in *bot.,* smooth and awl-shaped.

PLANOMETER, n. *pla-nŏmĕ'-tĕr* [Eng. *plane,* and *meter*]: a trial or plane surface on which articles are tested for straightness and level. It affords a standard gauge for plane surfaces.

PLANOM'ETRY: see PLANIMETRY.

PLANT, n. *plănt* [AS. *plante;* F. *plante*—from L. *planta,* a sprout or shoot; *planto,* I set or plant]: organized living body destitute of sensation, and drawing its nourishment from a source exterior to itself (see PLANTS): a sapling a small vegetable; a herb or shrub: in *law* (see below): the tools necessary to any trade; the stock, fixtures, etc., necessary to carry on any large concern, as railway *plant:* V. to put or set in the ground for growth; to set that it may increase, as the germ of anything; to perform the act of planting; to set firmly; to fix; to settle; to colonize; to establish; to fill or adorn with plants. PLANT'ING, imp.: N. the act or operation of putting plants in the soil. PLANT'ED, pp.: ADJ. set; fixed; introduced; settled. PLANTAGE, n. *plănt'āj,* in *OE.,* plants or herbs in general. PLANTATION, n. *plănt-ā'shŭn* [L. *plantatio,* a planting]: in *parts of Europe, etc.,* a portion of land planted with trees for production of timber and small wood (see ARBORICULTURE: FOREST LAWS: TREE: TIMBER TREES): the law concerning plantations in this sense is that, in general, whoever is owner of the soil is entitled to the trees planted in such soil. When land is let by lease to a tenant, the tenant does not become the owner of the trees, and cannot cut them down: see, further, ESTOVER. *Plantation,* in the *W. Indies* and southern *United States,* denotes a large land estate applied to rearing such crops as sugar-cane, coffee, cotton, tobacco, and pepper: new colony or original settlement. PLANT'ABLE, a. *-ă-bl,* capable of being planted. PLANTER, n. *plănt'ĕr,* one who plants; one who owns a plantation; one who introduces or disseminates. PLANT'ERSHIP, n. *-shĭp,* the business of a planter; the management of a plantation. PLANT'LET, n. *-lĕt,* a little plant. PLANT'ULE, n. *-ūl,* a young plant. PLANT-CANE, the sugar-cane of the first year's growth. PLANT-LOUSE, a small insect infesting plants and feeding on their juices; the Aphis (q.v.) SENSITIVE-PLANT, a plant the leaves of which are highly sensitive whenever touched; a species of *Mĭmōsa* ord. *Lĕgūm'ĭnōsæ.*

PLANT: living organic being, destitute of any indication of mind or feeling, and sometimes defined as essentially differing from an animal in the want of voluntary motion. Plants are the organisms which form the *vegetable kingdom:* the science which treats of them is Botany (q.v.). Plants of higher organization can never be mistaken for animals, nor animals of higher organization for plants. But there is no regular ascending and descending scale of organisms, from the highest animal to the lowest plant; instead we find a widely extended base from which the ascent seems to begin at once in both the organic kingdoms, with many ramifications in each; and in the case of the lowest groups of either kingdom, it is sometimes difficult to discern the difference between plants and animals. The difficulty may be owing to our ignorance and incapacity of proper observation.

Something which resembles the voluntary motion of animals is seen in some plants, in various phenomena of Irritability (q.v.); and there is even locomotion in the vegetable kingdom wonderfully simulating voluntary locomotion, a provision of nature for diffusion of some of the lower vegetable organisms; the *Gonidia* (q.v.) of Algæ and the *Spermatozoïdia* (q.v.) of some other cryptogamous orders moving in a surrounding fluid by means of cilia, so that they have often been mistaken for animalcules. But no motion which can really be deemed voluntary takes place in the vegetable kingdom; and no animal that can certainly be pronounced such fails to exhibit it—even when there is no power whatever of locomotion—in the prehension of food, or for some of the purposes of life.

The general laws which govern life prevail in plants as in animals. There are organs of nutrition and organs of reproduction; the whole being made up of organs, and every organ destined to maintain the existence either of the individual or of the race. But there is nothing in plants corresponding to the mouth, stomach, and alimentary canal of animals. Nutrition takes place in a different manner; assimilation being effected by a process very unlike that of digestion in animals. There are, however, animals destitute of a mouth, stomach, and alimentary canal; so that the distinction between plants and animals cannot be stated so absolutely in this respect as in respect to voluntary motion and as there are many plants which have no roots, nutrition by means of roots, though peculiar to the vegetable kingdom, is not its distinguishing characteristic. The nutriment of plants is derived either by their roots from the soil (see ROOT), or through the integuments of their other parts from the air or water in which they live; and all their nutriment is either liquid or gaseous, being taken up in the former case by Endosmose (q.v.), and in the latter case through *Stomata* (q.v.). Many plants, among them the greater number of phanerogamous plants, owe their nourishment both to the soil and to the atmosphere, their roots deriving it from the former, and the Leaves (q.v.) of plants that have leaves being the principal organs by which they derive it from the latter. When leaves are wanting, the

integument of the parts exposed to the air performs the functions ordinarily assigned to them. Solid matter cannot be appropriated by plants until it has been dissolved in water, or decomposed: see MANURE: SOIL.—The nutriment appropriated by the plant is not assimilated until it has undergone chemical changes, which sometimes take place entirely within the very cell through the integument of which it has entered, some of the lowest kinds of plants consisting altogether of only a single cell; but which, in other plants of higher and more complex organization, depend on a Circulation of the Sap (q.v.), and a very various action of many different organs, each formed of a multitude of cells. These processes are still very imperfectly understood. By them, not only is the plant nourished, but vegetable products of every kind are elaborated, in which, throughout the wide domains of the vegetable kingdom, there is such wonderful variety, and often great diversity in different parts of the same plant.

Whatever the source from which plants derive their nutriment, no organic substance is appropriated by them; but in order to their use, it must first undergo decomposition. With the exception of parasitic plants, which feed on juices not prepared by themselves, the food of plants consists wholly of inorganic matter; and the value of organic substances as manures depends not only on the abundance which they contain of the proper elements, but on the readiness with which they undergo decomposition so as to present these elements in most suitable form; which is not, however, as elements uncombined, but in various combinations with each other. Thus carbon and oxygen enter plants together in the form of carbonic acid, oxygen and hydrogen together in the form of water, hydrogen and nitrogen in the form of ammonia. Carbonic acid absorbed by the leaves from the air is decomposed within the plant, under the influence of light, and particularly of the direct rays of the sun, and its carbon enters into new combinations to form vegetable substances, while its oxygen is exhaled again into the atmosphere, which is thus maintained in a state fit for support of both vegetable and animal life by the opposite and balanced action of animals and plants. Of the elements which enter into the composition of vegetable substances, Carbon is most abundant; and, with it, Oxygen, Hydrogen, and Nitrogen constitute the chief part of every plant. Other elements, both metallic and non-metallic, are found in comparatively small quantity, though some of them are generally present in plants, as Calcium, Potassium, Sodium, Sulphur, Phosphorus, Silicon, Iron, Aluminium, Magnesium, Chlorine, and Iodine. Among the elements found in plants are to be enumerated also Bromine, Manganese, and Copper, which occur only in minute quantities, Copper very rarely.

There is no circulation in plants like that of blood in animals, nor any organ at all analogous to a heart; though there is constant motion or circulation of their juices, both throughout the whole organism and within individual cells. And though the term *respiration* has been often

employed with reference to plants, particularly to leaves, yet there is not only no action analogous to that of lungs, but no oxygenation of the juices by being brought into contact with the air; carbonic acid and ammonia—not oxygen—being imbibed from it for nutrition. And there is nothing in the vegetable kingdom having the slightest resemblance to a brain or a nervous system. In the possession of sexual organs, however, there is wonderful agreement, where it might least have been expected, between plants—at least all phanerogamous plants—and animals. As to this and other important points concerning the life of plants, see VEGETABLE PHYSIOLOGY: see also FLOWER: and titles of the different organs of which the flower is composed the articles FRUIT: SEED: SPORE: CELL THEORY: CELLULAR TISSUE: VASCULAR TISSUE: METAMORPHOSIS OF ORGANS: LEAVES: STEM: ETC. For the great divisions of the vegetable kingdom, see BOTANY, in connection with the subject of classification, and in various separate articles. For the GEOGRAPHICAL DISTRIBUTION OF PLANTS, and the DISEASES OF PLANTS, see those titles.

Besides the relations of the animal and vegetable kingdoms above noticed, in their joint and balanced action, keeping the constitution of the atmosphere in fitness for both animal and vegetable life, similar relations subsist in plants and animals as to temperature and as to their mutually providing food for one another. 'It would almost seem as if plants possessed a power of producing cold analogous to that exhibited by animals in producing heat, and of this beneficent arrangement man enjoys the benefit in the luxurious coolness of the fruit which nature lavishes on the tropics' (Sir J. E. Tennent). Flowers indeed produce heat; but the juices of plants are colder than the soil or surrounding atmosphere during the time of active vegetation; and the coolness of groves is owing not only to shade, but to the transpiration of moisture by the innumerable leaves.—Inorganic substances are appropriated by plants as food, and converted by a 'high and mysterious' chemistry into organic substances of many kinds, many of them suitable food for animals, which feed on organic substances alone. But the excrements of animals furnish food for plants; and when animals die, their bodies undergo a series of changes by decomposition, which terminate in the production of the substances most suitable for nourishment of plants. There is, moreover, not only this conversion of the same matter into animal and vegetable substances alternately; but there is also a continual transformation of matter which has remained inorganic throughout long geologic periods into organic substances; and in this some of the lowest kinds of plants are particularly employed, e.g., lichens, which decompose and feed on the very rocks on which they grow; while, on the other hand, the fossil remains of remote periods, and all the products of decomposition, exhibit matter which once formed part of living organisms returned to an inorganic state.

PLANTÆ TRISTES, n. plu. *plăn'tē trĭs'tēz* [L. *plantæ*, plants; *tristis*, sad, melancholy, *tristes*, plu.]: melancholy plants, so named because they expand their flowers in the evening only, as some species of Hesperis, Pelargonium, etc.

PLANTAGENET, *plăn-tăj'ė-nĕt:* surname of the French family of Anjou, which 1154 succeeded to the throne of England on the extinction of the Norman dynasty in the male line, and reigned till 1485, when it was supplanted by the family of TUDOR (q.v.). The name P. belonged originally to the House of Anjou, and is said by antiquarians to have been derived from the circumstance of the first count of this house having caused himself to be scourged with branches of broom (*planta-genista*), as a penance for some crime he had committed. On the extinction of the male line of the Norman dynasty in the person of Henry I., the crown of England was claimed by Stephen, Count of Blois, son of Henry's sister Adela, or Adeliza, and by Henry's own daughter Matilda ('the Empress Maud'), then wife of Geoffrey P., Count of Anjou, for her son Henry Plantagenet. Stephen, by favor of the nobles, was the successful competitor, on the condition that Henry should succeed him; accordingly on Stephen's death, 1154, the son of Geoffrey P. ascended the throne of England as Henry II. His sons Richard I. and John succeeded him, and the descendants of the latter in the direct male line—Henry III., Edward I., Edward II., Edward III., and (Edward III.'s eldest son, the Black Prince, having died before his father, leaving an only son, who as) Richard II.—succeeded without interruption. The eldest male line now became extinct, and it was necessary to choose the rightful heir to the throne from among the descendants of Edward III.'s other sons. His second son had died without heirs, but Lionel, Duke of Clarence; John of Gaunt, Duke of Lancaster; and Edmund Langley, Duke of York, his third, fourth and fifth sons respectively, were still represented by legitimate issue. Of these, Edmund Mortimer, Earl of March, and Anne Mortimer, wife of Richard, Earl of Cambridge (who was eldest son and heir of Edmund Langley, Duke of York), lineal descendants of Lionel of Clarence, possessed the prior claim to the throne; but Edmund was put in prison by Henry IV., the eldest son of John of Gaunt, Duke of Lancaster, who usurped the crown 1399, and transmitted it to his lineal descendants Henry V. and Henry VI. By this time Edmund Mortimer had died without heirs, and the descendants of the marriage of his sister Anne (heiress of Clarence) with Richard, Earl of Cambridge (heir of York), uniting the claims of the *third* and *fifth* sons, had, through their maternal ancestress, a superior claim to the throne over Henry VI. the Lancastrian monarch, who represented only the *fourth* son of Edward III. Richard, Duke of York, son of Richard of Cambridge and Anne Mortimer, attempted to obtain the crown, but he was taken and put to death, leaving to his sons the task of avenging his death, and asserting the claims of the combined house of York and

Clarence to the throne, in which they were ably assisted by Richard Neville, Earl of Warwick ('the King-maker'). The result was a long and desolating civil war (1455–85) between the partisans of York and Lancaster, which is known in history as the 'Wars of the Roses' (the Lancastrians having chosen for their emblem a *red* and the Yorkists a *white* rose), in which more than 100,000 persons perished, and many noble families were either extirpated on the field and the scaffold, or completely ruined. During this dreadful contest, in which the Yorkists generally had the advantage, Edward IV. (eldest son of the Duke of York who had suffered death), his son Edward V., and his brother Richard III. (q.v.) successively swayed the sceptre. But Richard's cruel and tyrannical govt. added new vigor to the reviving Lancastrians, and Henry Tudor (see HENRY VII.), representative of their claims, defeated the Yorkist tyrant on the field of Bosworth; and then, by his marriage with Elizabeth, eldest daughter of Edward IV., and representative of the Yorkist claims, reunited in his family the conflicting pretensions to the throne, which he transmitted in peace to his descendants. See TUDOR: and for the events of this contest, see ROSES, WARS OF THE.

PLANTAGINEÆ, *plăn-ta-jĭn'ē-ē* or PLANTAGINACEÆ, *plăn-ta-jĭ-nā'sē-ē:* nat. order of exogenous plants, mostly herbaceous and without stems; the leaves forming rosettes, flat and ribbed, or taper and fleshy; the flowers generally in spikes; the calyx 4-parted, persistent; the corolla hypogynous, membranous, persistent, its limb 4-parted; the stamens inserted into the corolla, with long filaments; the ovary free, of a single carpel, 1–4-celled; the fruit, a membranous capsule with a lid. The *testa* of the seeds abounds in mucilage, easily extracted by boiling water. There are about 120 known species, diffused over all parts of the globe, but most abundant in temperate and cold countries. The most important genus is *Plantago*, the species of which often receive the English name PLANTAIN, *plănt'ān* [F. *plantain*—from L. *plantāgo*, or *plantag'inem*, a plantain]. Of this genus are the following: COMMON PLANTAIN (*P. major*), a perennial with broad, ovate stalked leaves and long cylindrical crowded spikes, common in pastures, waysides, etc. It is very widely diffused over the world. Its seeds are a favorite food of birds, and the gathering of the spikes to feed cage-birds is familiar. The leaves are applied to wounds in domestic medicine in many districts. They are said also to be a useful application to ulcers and indolent scrofulous tumors.—The RIBWORT PLANTAIN, or RIBGRASS (*P. lanceolata*), common in the e. United States, and in some countries occasionally sown by farmers because its foliage is produced early in the season, and is then acceptable to oxen, sheep, and horses; but deemed most suitable for poor soils, as its spreading leaves occupy too much ground, and choke better grasses in rich land. Its leaves are lanceolate, and taper at both ends; its spikes are short, ovate or cylindrical, and placed on long, angular stalks. Its seed is acceptable to cage-birds. Besides these, naturalized from Europe, we have many native

species and varieties: the few-flowered *sparsiflora*, w. and s.; the heart-leaved *cordata*, rare; the *maritima*, leaves ribless, in salt-marshes, n.; the more or less dicœcious *Virginica* (4 stamens), and the 2-stamened *pusilla* (pod 4-seeded), and *heterophylla;* also the silky-woolly *Patagonica*, N. and S. Amer.—The mucilage of the seeds of *Plantago ispaghula*

Greater Plantain (*Plantago major*).

and of *P. psyllium* is much used in India in catarrhs and other complaints; and *P. psyllium*—called FLEAWORT, and its seeds FLEASEED—is cultivated in France for this mucilage, which is used by paper-stainers in preference to that from linseed, also by muslin manufacturers for stiffening their goods. The plant has a branched spreading stem, and recurved leaves.

PLANTAIN.

PLANTAIN, or PLANTAIN-TREE [Sp. *platano:* F. *plantain*], (*Musa Paradisaica*): a most important food-plant of tropical countries, and one of the largest of herbaceous plants; of nat. order *Musaceæ* (q.v.); native of the E. Indies, where numberless varieties of it have been cultivated for thousands of years. It is now diffused over all tropical and subtropical regions of the globe. It must have been carried to America soon after or during the time of Columbus, for its fruit was a principal article of food there in the first half of the 16th c.; but there is nothing to support the conjecture of Humboldt that there may be different species cultivated under the name P., and some of them natives of America. The P. is now, however, cultivated to the furthest depths of the primeval Southern American forests, is carried by the natives in their frequent changes of residence, forms the wealth of many occupiers of land in the vicinity of great towns, where large plantations of it are made, and is a true staff of life to the population of all colors and classes in tropical countries. In many regions it is the principal article of food.

In the genus *Musa* there arise from the midst of the leaves—or apparently from the top of the stem, the sheathing bases of the leaves forming a tree-like false stem—stalks which bear great spikes of flowers, each inclosed in a large bract or spathe; the flowers, and afterward the fruit, are arranged in clusters or almost in whorls on the stalk; the flowers have a perianth of six segments, five of which cohere as a tube slit at the back, and the sixth is small and concave; there are six stamens, one or more of them imperfect; the germen is inferior, 3-celled, with two rows of ovules in each cell; the fruit is fleshy, and has many seeds imbedded in its pulp. The name *Musa* is from the Arabic *moz*, a plantain; the P. seems to be described by Pliny under the name *pala*, a name probably derived from an eastern root, from which comes also the name *plantain*. The specific name *Paradisaica* alludes either to a fancy that the P. was the forbidden fruit of Eden, or to a legend that the aprons which our first parents made for themselves were of P. leaves.

The stem of the P. is usually 15 or 20 ft. high, though there are varieties having a stem of only 6 ft. The leaves are very large, the blade being sometimes 10 ft. long and 3 ft. broad, undivided, of beautiful shining green; the midrib strong and fleshy. The fruit is oblong, varying from its usual long shape to an almost spherical one, obscurely angular, 8 to 12 inches long in the varieties commonly known by the name P., of which the fruit is usually cooked or prepared in some way in order to be eaten, and very often forms a substitute for bread; while the smaller-fruited varieties, of which the fruit is eaten raw, are generally known by the name Banana (q.v.); these names, however, being somewhat variously used.

The P. is generally propagated by suckers; and a sucker attains maturity in about eight months or a year after being planted. The stem is cut down after fruiting, but the plantation does not require renewal for 15 or 20 years.

Plantains ought to be at least 10 ft. apart in plantations of them, or 6 ft. in single rows around fields or gardens. The P. has been sometimes cultivated with success in hot-houses.

With the exception of two or three palms, it would not be easy to name, in the whole vegetable kingdom, any plant applied to a greater number of uses than the plantain. The fruit is eaten sometimes raw, though more generally —except that of the Banana (q.v.)—boiled or roasted, and variously prepared. It is both farinaceous and saccharine. In most of the varieties it has a sweetish taste; in some it is mealy; in some it is subacid or austere. It is as much used before being perfectly ripe as when it is so. In the W. Indies the P. boiled and beaten in a mortar is a common food of the negroes. Plantains baked in their skins, or fried in slices with butter and powdered over with sugar, are favorite dishes in some tropical countries. They are preserved by drying in the sun or in ovens, and pressed into masses, in which state they keep for years, and furnish wholesome food. The unripe fruit, peeled, sliced, dried, and powdered, is called *P. meal,* and in Guiana *Conquin-tay;* it is whitish with dark-red specks, a fragrance like orris-root, and a taste like wheat-flour; and is made into excellent and nourishing dishes. A good and wholesome starch is obtained from the P. by rasping and washing.—A decoction of the fruit is a common beverage; and a kind of wine is obtained from it by fermentation.—The top of the stalk is a good boiled vegetable.—The leaves are much used for packing, and many other purposes; the fibre of their stalks is used for textile purposes and for cordage; and it is probable that it might be used for paper-making; but hitherto the leaves and stems of plantains have been generally burned or left to rot.

So great is the food product of the P., that, according to Humboldt's calculation, it is to that of the potato as 44 to 1, and to that of wheat as 133 to 1. The culture requires little attention.

The name P. is frequently extended to the whole genus *Musa.* Wild species, with austere fruit, are found in many parts of the East. One is found on the Himalayas at an elevation of 6,500 ft. A species in the South Sea Islands (*M. troglodytarum*) is remarkable for bearing its clusters of fruit erect, not pendent like the other species. Its fruit is eatable, as is that of *M. Cavendishii* and of *M. Chinensis,* species or varieties smaller than the common plantain.—The *Musa* extensively cultivated in the Philippine Islands for its fibre, *Abaca* or *Manilla Hemp,* is similar to the common P., but has a green, hard, and austere fruit. It is generally cut when about a year and a half old, before flowering. The outer layers of the stem yield the coarsest fibre; that of the inner is so fine that a garment made of it may be inclosed in the hollow of the hand.—The young stems of *M. Ensete,* the ENSETE of Abyssinia, are used in that country as a boiled esculent.

PLANT'AIN-EATER (*Musophaga*): genus of birds of family *Musophagidæ*, to the whole of which the same English name is often extended. The *Musophagidæ* are tropical birds, African and S. American, of order *Insessores*, and tribe *Conirostres*, allied to finches, but many of them large, and more like gallinaceous birds than finches. They are birds of beautiful plumage. They have strong, thick bills, more or less curved on the top, the cutting edges jagged, or finely serrated, so as to render them very efficient instruments for cutting soft vegetable substances on which they feed, as the plantain and other fruits, and for dividing the succulent stems of plants which they cut off close to the ground. They live much among boughs of trees, and are active and wary birds. The true plantain-eaters (*Musophaga*) have the base of the bill extending upon the forehead; the TOURACOS (*Corythaix*) have a smaller bill, and the head crested.

PLANTAR, a. *plănt'ăr* [L. *planta*, the sole of the foot]: pertaining to the sole of the foot.

PLANT-BREEDING. The systematic breeding of plants is a relatively new art, which has been brought into prominence by the epoch-making work of Mendel, De Vries, Correns, Bateson and others on the scientific side, and of Burbank, Hays, Webber, Nilsson and many others on the economic side.

Plant-breeding involves every process by means of which the parentage and hereditary qualities of plants are intentionally controlled, whatever may be the object to be attained. As the scientific and economic phases of plant-breeding have wholly different aims, and consequently require many differences of technique, they will be considered separately. In each the end to be attained determines the methods employed. To the scientific investigator the perfect control of lines of descent or full knowledge of them supplies the only means of solving problems in heredity and evolution; and in many physiological, cytological, and even taxonomic studies, the control of parentage is necessary for decisive results, since it has been recently shown that taxonomic species as now interpreted are very generally made up of a number of distinct elementary forms, each having its own peculiarities of morphological and cytological structure and each its own characteristic series of physiological reactions. The body of data regarding variation, heredity, etc., acquired by means of fully controlled breeding, and the principles or laws derived from these data, together constitute the science of 'Genetics,' and as the scientific breeding of both animals and plants lead to essentially the same results, they will be considered together under that head.

Plant-breeding for economic purposes has for its aim the production of new varieties which shall be superior to those already in existence with respect to some one

or more desirable characteristics, or the improvement of the old varieties by the development of their variable qualities to the highest degree of efficiency. Owing to man's unlimited dependence upon the vegetable kingdom, directly or indirectly, for food, clothing, shelter, medicine, and materials needed in all the mechanic arts, as well as the means of refining and beautifying his surroundings, the directions which plant-breeding may take are obviously limitless, and the possibilities to be attained can not now be foreseen; for, unlike the breeding of animals, the breeding of plants is still in its early infancy.

It has been known only a little more than two centuries that plants reproduce themselves by a sexual process, this fact having been discovered by Camerarius in 1691. The corresponding fact regarding the reproduction of animals has always been a part of human knowledge. The first recognized plant hybrid was produced about 1700 by Gmelin and the first of any economic value was Fairchild's *Sweet William*, produced by Thomas Fairchild in 1717. The first work of real economic importance was done by Thomas Andrew Knight with fruits and vegetables, and by Dean Herbert, with the *Amaryllis*, early in the 19th century. During the 19th century many triumphs of the plant-breeder's art have added to the comforts and pleasures of mankind. and the names of Adlum, Bull, Brinklé, Gideon, Van Mons, Fuller, Hovey, Breese, Burbank, Carman, Eckford, Crozy, Wilks, and many others are known as the originators of one or more varieties which have been or are so widely known as to be almost household words.

But while the products of the breeder's art have been thus widely known, the processes by which these results have been secured have attracted general notice in this country only through the long sustained efforts of such men as Moore, Gideon. Burbank and Munson, and the equally brilliant, though less extensive work of Hays and Webber. In Europe plant-breeding has been a recognized occupation for many years.

Plant-breeding is now being carried on by the United States Department of Agriculture at Washington, and by many of the state experiment stations. All of the agricultural colleges give instruction in the subject and Cornell University has recently established a department of plant-breeding under the direction of Dr. Webber for purposes of research and advanced instruction.

Although each plant-breeder has used slightly different methods in the search for improved varieties there are certain fundamental facts which underlie them all, and these form a general basis for systematic plant-breeding. Some of these facts are here briefly stated and the more important are afterwards treated more at length.

(a) All plants are in such a state of variation that

no two individuals are alike, even though coming from the same parentage and grown under the same conditions.

(b) Culture under unusual conditions tends to accentuate these variations and make them more easily distinguishable.

(c) Some of the variations are fully inherited and most of them are partly so.

(d) Plants which are not too unlike may be crossed, giving very different results in different cases, but in many ways favoring the work of the breeder.

(e) On crossing, many of the characters which make up a plant behave more or less definitely as units, capable of separation and recombination into as many distinct groupings as there are thinkable combinations of the units involved.

(f) Most of these combinations contain at first hidden qualities which reappear in the second and later generations, but all combinations are capable of being freed from these by continued breeding, and in this way almost any desired combination may be made a characteristic of a permanent seed strain.

(g) In plants which can be propagated by some vegetative means, c. g., by buds, grafts, cuttings, offsets, tubers, bulbs, etc., almost any desirable variation may be, by unlimited division, at once made the distinctive character of a new race, because in such cases each new plant is simply a piece of the original individual and retains all of its qualities. A variety consisting of the fragments of a single individual is called a klon (Webber), a word taken direct from the Greek, which might perhaps be anglicized to 'clone.'

As the variations which occur without the crossing of distinct races or species are usually slight, or, if considerable, then infrequent, the most common procedure of the plant-breeder is to bring together for crossing such varieties or species of the particular plant upon which it is desired to work, as possess conjointly the nearest approach to all the characteristics of the ideal variety which it is desired to produce, or if the aim is a more general one, namely, to develop all the possibilities there are in a group, all available species and varieties are brought together and crossed. In some cases this is done purely for the sake of combining the desirable qualities of the different strains or species, but more generally it is done to secure the breaking up of the several types into their component characteristics in order that the various recombinations of these characteristics may result in the production of numerous forms among which selection may be made.

So many cultivated plants are already hybrids, especially those which are propagated vegetatively, that many excellent varieties have been produced without resort to further crossing, by simply sowing the seeds

of these hybrids and selecting desirable types from among the offspring. In most such cases the ancestry is wholly unknown and there is consequently no possible way of predicting the character of the offspring. This is in consequence the lowest type of procedure which may be called plant-breeding, and if the process stops at finding the desirable seedling in the first crop the process is scarcely to be included in plant-breeding since there is in this case no control of any other element in parentage except the mother. If from such a crop of seedlings the best is selected and used as the parent of a second progeny out of which the best is again chosen, two elements have been controlled, namely the mother and the grandmother. The larger the number of generations during which such a process is carried on the greater is the degree of control over hereditary qualities. But so long as the other parent is left out of account the degree of control can be neither great nor sure, as it is now well-known that the male shares equally with the female the power of determining the characters of the offspring. The highest type of the breeder's art is that in which both lines of parentage are selected with the greatest judgment and controlled with precision. While even from the lowest grade of plant-breeding some valuable new varieties may be produced, it is only from the perfect control of parentage that the principles of the art can become known, and it is the lack of such complete control of parentage in most of the work that has been done, that leaves plant-breeding today so largely an empirical subject to be carried on almost entirely by the 'rule of thumb' method. (For such principles of hybridity as are known, and methods of producing hybrids, see HYBRIDIZATION).

It is in the production of new varieties of annuals, biennials, and other plants which bloom and fruit but once that the complete control of parentage is of the greatest importance, for the initial production of a desirable individual is only a small beginning toward the mark aimed at, namely, the production of a variety, *all* of whose individuals shall possess the desired quality. This does not apply, of course, to the extremely small proportion of hybrids, which breed true to their hybrid characters. Most fertile hybrids of the first generation possess all the characters of both parents, but some of these characters are invisible owing to the antagonism of corresponding characters derived from the other parent. Such characters invisible in one generation and reappearing in some individuals of the next generation are called 'recessive' characters. The invisible or recessive characters are transmitted to the offspring in all possible combinations with each other and with the visible characters, so that in the second and later generations many variations are likely to appear which were not seen in the first generation. Some of these will be like the first generation in all respects, even to the

possession of a similar series of invisible, recessive characters. Others will look the same but possess a smaller number of recessive characters. Still others, while possessing all the same visible characters, will have no recessive characters, and these latter specimens will produce offspring only like themselves, while those which possess some one or more recessive characters will break up again into different types in the following generation. The important principle here outlined has been long recognized in essence, though not until the discovery of Mendel's Law (q.v.) was its nature fully understood.

The knowledge that external appearance is only to a very limited degree a measure or indication of the hereditary qualities possessed by any individual and which it is capable of transmitting to its offspring, and that therefore individuals which appear to possess the same ensemble of characters, have very different potentialities, is very valuable to the breeder, and it is being more and more utilized in breeding through the development and application of what are known as 'isolation methods.' The essential features of all isolation methods is the keeping separate of the progenies of individual mothers, or preferably of pairs of parents, and the rating of these parents according to the characters of their offspring instead of their own characters. These methods resemble to some extent those of the animal breeder who selects his breeding stock according to 'performance records' except that in the case of the isolation methods of the plant breeder the performance consists in the production of desirable offspring, while the performance record of animals very often involves some one or more other activities.

The first isolation method was developed by Vilmorin in the improvement of the sugar beet, and hence the general method is sometimes spoken of as 'Vilmorin's Isolation Principle.' Seeds from individual beet-plants were grown in parallel rows, one row from the seed of each mother plant. The beets from a portion of each row were tested for their sugar content, and only those rows were allowed to furnish seed for the continuation of the cultures, which made the best showing in the comparative tests. By this method, followed year after year, the percentage of sugar in the beet was increased in about 25 years from 6 to more than 20 per cent. Another isolation method was developed by W. M. Hays for the breeding of new wheats at the Minnesota State Experiment Station. It is known as the 'Centgener method.' One hundred plants, the offspring of a single mother, are grown on a square of given area. Records are kept regarding all the economic features of the plants growing on each plot, including weight, chemical composition and milling qualities of the grains produced. This performance record of the Centgener plot is used as the rating of the original mother-plant. Some of

the best wheats which have been produced were discovered in this way. The Centgener method is nearly ideal for varieties, which are self-fertilizing as wheat and most other grains, and many grasses are. Quite independently, H. Nilsson, director of the Swedish Agricultural Station, at Svalöf, has been following a similarly rigid isolation method since 1891 in the improvement of wheat, barley, rye and many other plants, with like noteworthy results. More attention has been paid to the morphological or so-called 'botanical' characters of the varieties at Svalöf and as a result it has been demonstrated that each of the older varieties consists of a number of distinct types, each with its own distinctive and fully inherited characters. It is obvious that in these cases, of improvement by selection alone, the work of the breeder is not to *produce* a new variety, but to *discover* and *isolate* it, i.e., separate it in a pure state from the inferior sorts with which it has been associated.

In the improvement of Indian corn an isolation method almost identical with that of Vilmorin has come into pretty general use. This is called the 'Ear-row test' and consists in the selection of the best ears and planting them in parallel rows, each row being planted from the grains of a single ear. The rows are then compared each by each, with respect to all desirable characters, and seed is saved only from the best rows. A factor in corn breeding which has presented difficulties in the conduct of isolation methods has been the obviously deleterious effects in this species, of too narrow inbreeding, and many efforts have been made to secure the advantages of selection while guarding against these injurious effects. What appears to be one of the best of these methods was outlined by Professor Miller at the third annual meeting of the American Breeder's Association, Columbus, Ohio, 1907, January, and printed in the annual *Proceedings* of the Association for that year.

The literature of plant-breeding is not yet very extensive, the more important works being Bailey's *Plant Breeding* (1895); De Bries's *Plant-breeding; Comments on the Work of Nilsson and Burbank* (1907); reports of three Hybridization Conferences, 1900, 1902, 1906, the first and third under the auspices of the Royal Horticultural Society and the second under the auspices of the New York Horticultural Society; and the *Annual Reports* of the American Breeder's Association.

PLANTIGRADE, a. *plăn-tĭ-grād* [L. *planta*, the sole of the foot; *grădus*, a step]: walking on the whole sole of the foot, as a bear; N. an animal that does so. PLANTIGRA'DA, *-grā'da*, in Cuvier's zoological system, a tribe of *Carnivora* (q.v.), characterized by placing the whole sole of the foot on the ground in walking. The sole is generally destitute of hair. Both fore and hind feet

are five-toed in all the plantigrada. The Plantigrade are generally more or less nocturnal in their mode of life, and their movements are slower and their gait more clumsy than those of the *Digitigrada*. They are also, in general, less carnivorous; many feed in part or occasionally on vegetable food. The conformation of their limbs and feet gives them a power of standing erect on their hind-feet, which none of the *Digitigrada* naturally possess, and of which advantage is taken in tame bears for the amusement of spectators.

PLANTIN, *plŏng-tăng'*, CHRISTOPHE: eminent printer: 1514–89; b. St. Avertin, near Tours, France. He set up a printing-establishment at Antwerp 1549, which soon became the greatest and most celebrated of the time. He had often 20 presses or more in operation. Later he had establishments in Leyden and Paris also. Guicciardini mentions his printing-establishment as the finest ornament of Antwerp, and as one of the wonders of Europe, and the learned agreed in regarding him as the first printer of his time, though he was contemporary of Aldus and Estienne (Stephens); but this is true only as regards number of works, and beauty of their typography; for the services which the others have rendered to classic literature are far beyond those of Plantin. He was nevertheless a man of varied, though probably not profound learning. He superintended the publication of works in several languages, and was extremely careful of their accuracy, employing able and learned correctors of the press, whom he remunerated liberally, and publicly offering rewards for the discovery of errors. The most noted of all his publications is the *Biblia Polyglotta* (8 vols. 1569–73), printed under personal superintendence of the learned Arias Montanus, court chaplain of Philip II. of Spain. Plantin died at Antwerp. His office in Antwerp was bought by the city 1876 for 1,200,000 francs; when out of it was created the 'Musée Plantin,' opened 1877, Aug. 19.

PLANTS AND ANIMALS, ANESTHESIA OF. Living protoplasm, which is the essential working substance in every live animal and plant, is sensitive in its normal condition to influences from without and within. In man and, to a less degree, in lower animals sensation may take the form of pain. Various substances, called anesthetics, when acting upon protoplasm, destroy sensitiveness to pain for a time. In the human body and in all other animals having nervous systems it is probable that the anesthetic acts chiefly upon the nervous tissues, but in the lowest types of animals and in plants no specialized nervous tissue is found and the anesthetic acts directly upon the protoplasm. In addition to inhibiting pain, an anesthetic destroys the power of voluntary motion while the muscles of the involuntary system, e.g., the heart, continue their activities. In the lowest animals and in plants, in which no muscles are differentiated, an anesthetic destroys the power of con-

traction in animal cells and stops both the flow of protoplasm and its chemical action in plant cells. Anesthetics may be applied to green plants while they are manufacturing starch and evolving oxygen under the stimulus of direct sunshine and stop the chemical activity of the protoplasm, which is again resumed on the withdrawal of the anesthetic by suitable means. The degree of anesthesia and its continuance in any case may be controlled by careful attention to the dose of the drug and its action on the organism. The less profound effects of an anesthetic resemble the condition of sleep and animals recover from it quickly and with no danger of fatal results.

The anesthetics most commonly employed in medicine and surgery are chloroform and sulphuric ether. These are readily administered to air-breathing animals by mixing the vapor of the anesthetic with the air used for respiration, but they are not suited for use with the great number of small or microscopic aquatic or semi-aquatic species which are of special interest and value in the study of live protoplasm while it is functionally active. The importance of this line of investigation is apparent when one notes that the characteristic of modern biological study, including zoölogy, botany, animal and plant physiology, and medical and surgical science is its interest in live protoplasm and in what it does and how it acts, rather than in the anatomical details of dead organisms so well and profitably studied in the past decades. Chemical science has lent its aid to biology by the discovery of a chemical combination of chloroform and acetone, called chloretone, having the formula $C_4H_7Cl_3O$. Chloretone was introduced into medical practice as an hypnotic and into surgery as a local anesthetic. By its use studies of small and microscopic aquatic and semi-aquatic animals in the live state are made with a success heretofore unattainable and rules for its use on typical species ranging from to one-celled *Amœbæ* to frogs have been worked out and thoroughly tested, both in general laboratory work and in the study of live animals by the aid of projection microscopes (q.v.). Animals may be treated with chloretone so as to produce and maintain for periods of time sufficient for accurate study any degree of passiveness of the locomotory function without serious interference with the other bodily functions.

The method of using chloretone is simple and safe in the hands of inexperienced young students. A stock solution of approximately one per cent. strength is made by adding to clear, not distilled, water more chloretone crystals than will dissolve. This saturated stock solution or, usually, suitable dilutions of it, is administered to animals and plants by immersing the organisms in it. By adding either stock solution or clear water any degree of intensity of action of the anesthetic may be obtained and the results of its marked

differential action on different sets of muscles and, last of all, upon cilia; may be utilized in the study. At the conclusion of a period of study the anesthetized animals may be placed in clear water, in which the effect of the chloretone soon passes off, and they may be repeatedly used on the same or successive days.

To determine the strength of solution which gives the best results with a species place one or more normal specimens of the species in a measured quantity of water sufficient to cover them and add slowly measured quantities of stock solution while its effects are noted. Young animals of any species require weaker solutions than adults of the same species. Animals having relatively thick chitinous exoskeletons require stronger solutions than soft bodied species. The data given below will serve as a general guide, the specimens to be immersed, in each case, in a solution of one part stock solution added to the number stated of clear water. Adult crayfish require full strength stock solution; nymph of dragon-fly, equal volumes of water; leech and the water-flea *Daphnia pulex*, two and a half volumes of water; planarian worm, three volumes of water, and frog the same, but the latter must not be left in the solution over five minutes; earthworm, very young crayfish and tadpoles, five volumes of water, and goldfish, twenty to thirty volumes of water.

The anesthesia of green plants and of the protoplasm in cells containing no chlorophyl is an interesting demonstration of the likeness between the fundamental working substances in animals and plants. Chemical analysis has shown the likeness in composition of animal and plant protoplasm. It is not to be wondered at that biologists find it impossible to determine, with certainty, whether certain of the simplest of living things are animals or plants. The common pond-weed, *Elodea canadensis*, evolves oxygen rapidly when a vigorous growing tip is freshly cut from the plant and placed in water in direct sunshine (see MICROSCOPE PROJECTION, Fig. 6). Bubbles of oxygen are given off freely from the cut end of the stem. If, while bubbles of oxygen are being evolved, chloretone stock solution be added in volume equal to the water, the evolution of oxygen ceases. When anesthesia is complete dilute the solution by the addition of at least four volumes of water and the manufacture of starch with its accompanying liberation of oxygen from the plant is resumed. The circulation of protoplasm in the stamen hairs of various species of *Tradescantia*, or 'spiderwort,' may be stopped by the anesthetizing action of chloretone mixed with equal volumes of water. After the circulation has completely stopped, as seen under a compound microscope, replace the anesthetizing solution with clear water and the circulation begins again in a way strikingly similar to the resumption of activity by animal cells under similar treatment.

PLANUDES.

The following greatly condensed summary of a laboratory study of earthworms, which has been in practical use for some years, will indicate the character and scope of the work on this and other suitable species of animals. A pink, never brown, colored earthworm of from one to two and a half inches in length is washed in water, anesthetized in chloretone stock solution one part to water five parts, mounted in the anesthetizing solution in a compressor (See MICROSCOPE PROJECTION, Fig. 4) or between two glass plates, compressed to about half its normal thickness, and studied with the aid of a hand magnifier and compound or projection microscope using a one-half or two-thirds inch objective. Many of the most interesting and instructive details of structure and functional activities are seen in every earthworm which is carefully selected and prepared. The circulatory system shows clearly, as the red blood is seen in the pulsating dorsal blood vessel and ten or twelve beating 'hearts,' in the ventral, subneural, supraneural, lateral blood-vessels and in the capillaries; the corpuscles of the cœlomic fluid are seen in motion in the body cavity. The alimentary system is a tube, variously modified to form the different organs, extending the entire length of the worm. The buccal sac is often pushed out of the mouth as in feeding, the pharynx, esophagus, thin walled crop with contained food, the thick walled gizzard with sand grains and partly ground food, and the stomach-intestine are easily seen. Of the muscular system the longitudinal and circular muscles in the body wall, the muscles of the sectae, muscular bands in the wall of the gizzard, and, with difficulty, the circular muscle fibers in the wall of the dorsal blood-vessel may be seen. The coiled tubes and ciliated tunnels of the nephridia and, in the best specimens, the movement of the cilia in the funnels furnish the details of the excretory system. The 'brain' and nerves extending from it, the pharyngeal collar, and ganglia of the ventral nerve-chain are visible parts of the nervous system. In adult worms the organs of the reproductive system are to be seen. The dorsal blood-vessel and 'hearts' are seen in pulsation and the gizzard grinding food, while one looks into a 'brain' which is controlling the vital activities of the live worm. Such studies afford first hand knowledge of the structure and functions of live animals, which is at once interesting, instructive, and inspiring. Methods of anesthetizing typical animals and plants for laboratory study and research work are given in detail in Cole's *Manual of Biological Projection and Anesthesia of Animals* and, less fully, in his articles on *The Technique of Biological Projection and Anesthesia of Animals in Journal of Applied Microscopy and Laboratory Methods* (Vol. V. No. 3—Vol. VI. No. 12).

PLANU'DES, MAXIMUS. See ANTHOLOGY.

PLANULA, n. *plăn'ū-lă* [L. *plān'ūla*, a little plane—from *plānus*, flat]: the oval ciliated embryo of certain of the Hydrozoa.

PLANXTY, n. *plănks'tĭ:* a well-known dance among the Irish.

PLAQUE, n. *plăk* [F.]: a plate; a thin slab of wood used in cabinet making; a veneer; an ornamental plate of china or other ware upon which pictures are painted; a brooch; the plate of a clasp; a flat plate of metal upon which enamels are painted; hence, the word is applied to the small enamels themselves, done at Limoges in the 15th century.

PLASENCIA, *plâ-sĕn'thē-â:* ancient and much-decayed, but picturesque town of Spain, in Estremadura, 43 m. n.n.e. of Caceres; on a steep hill, with beautiful and fertile valleys, extending on the n.w. and s.e. sides. It is almost wholly girdled by the clear waters of the Jerte; and the surrounding scenery, embracing city, castle, river, rock, and mountain, and overarched by a sunny and unclouded sky, is remarkably beautiful. The city contains the picturesque remains of an ancient castle, and is surrounded by crumbling walls, surmounted by 68 towers, and pierced by six gates. Water is brought to the town by an aqueduct of 80 arches. There are seven Gothic churches, an episcopal and several other palaces, besides the cathedral, an ornate Gothic edifice, begun 1498, some portions of which are still unfinished, and others have been altered and disfigured. The cathedral contains many noble tombs, with effigies. Plascenia, a formerly flourishing and important city, was founded 1190. Pop. about 10,000.

PLASH, n. *plăsh* [Ger. *platschen*, to plash: Dut. *plaschen;* Sw. *plaska*, to paddle, to splash; Gael. *plais*, to splash]: a little pond or puddle: V. to dabble in water; to make a noise by disturbing water. PLASH'ING, imp. PLASHED, pp. *plăsht.* PLASHY, a. *plăsh'ĭ*, abounding with puddles.

PLASH, n. *plăsh* [OF. *plesser*, to fold or plait young branches to thicken a hedge—from mid. L. *plessa*, a thicket of interwoven boughs—from L. *plexus*, twisted]: a small branch slightly cut and twisted among other branches to thicken a hedge: V. to entwine or unite branches; to splice. PLASH'ING, imp. PLASHED, pp. *plăsht.*

PLASMA, n. *plăz'mă* [Gr. *plasma*, a thing molded or formed, an image or model—from *plassō*, I mold]: a silicious mineral, a variety of quartz or chalcedony, of dark green color, black when unpolished and seen by reflected light, but very translucent when held between the eye and the light. It is very nearly allied to heliotrope or blood-stone, but has no red spots, is more translucent, and is not susceptible of so brilliant a polish. It is never found crystallized. It is rare, and the finest

specimens are from India and China. It was highly prized by the ancient Romans, who wrought it into ornaments of various kinds; and very fine engraved specimens have been found among the ruins of ancient Rome. The ancients are said to have obtained their plasma from Mount Olympus in Asia Minor. The name Plasma is supposed identical with the Greek *prason*, a leek, the *r* having passed into *l*.—In *physiol*, the term Plasma is applied to the colorless fluid part of the blood in which the corpuscles float. PLASM, n. *plăzm*, mold or matrix.

PLASMIN, n. *plăz'mĭn* [Eng. *plasma*]: in *chem.*, a constituent of the blood to which is attributed the property of spontaneous coagulation. It is soluble in water, and is deposited in flocks from its solution in sulphate of sodium by saturation with chloride of sodium. When heated to 100° it becomes insoluble in water, and when dissolved in 20 parts of water, it soon solidifies to a colorless jelly.

PLASMODIUM, n. *plăz-mō'dĭ-ŭm* [Gr. *plasma*, a thing molded or formed; *eidos*, resemblance]: in *bot.*, a protoplasmic body formed by the coalescence of swarm-spores in myxosporous fungi.

PLASMOGONY, n. *plăz-mŏg'o-nĭ* [Eng. *plasma*; Gr. *gonē*, off-spring]: in *biol.*, the generation of an organism from a plasma.

PLASSEY, *plâs'sē* (*Palásí*): battlefield on the Bhâgirathi river, 96 m. n. of Calcutta. The river has now washed away the scene of the struggle. Plassey is celebrated in the history of India for the great victory gained by Clive (q.v.) over Suraja Dowlah, subahdar of Bengal, 1757, June 23, a victory which laid the foundation of British supremacy in India. The British force at the battle of Plassey consisted of 1,000 British troops and 2,000 sepoys. The subahdar's force consisted of 15,000 cavalry and 35,000 infantry, with 40 French artillerymen, and 50 large cannon.

PLASTER, n. plâs'tèr [AS. plaster; Dut. pleistre; F. *plâtre*; OF. *plastre*, plaster—from mid. L. *plastrum*—from Gr. *plassö*, I form or mold: Sp. *plasta*, soft clay; *plaste*, fine paste: Gael. *plasd*, to plaster]: composition of lime, water, and sand for coating walls and ceilings; a material, calcined gypsum, of which moldings, casts, etc., are formed; adhesive medicinal substance spread on leather or cloth for applying to sores or wounds (see PLASTERS): V. to overlay with plaster; to cover with plaster, as a wound; to smooth over; to cover over, or conceal defects: ADJ. made or consisting of plaster. PLAS'TERING, imp.: N. the plaster-work of a building (see below). PLAS'TERED, pp. *-tèrd*. PLAS'TERER, n. *-tèr-ėr*, one who works in plaster. PLASTER-STONE, gypsum, or stucco-stone. PLASTER OF PARIS, cement or plaster obtained by calcining gypsum or sulphate of lime, so called from its having been prepared first near Paris;

it is usually sold in the form of a white powder, and largely employed in the arts: See GYPSUM.

PLAS'TERING: art of covering walls, partitions, ceilings, etc., with a composition of lime mixed with sand and hair. It is done usually in three coats. The first coat is the solid foundation on which the rest is placed; it is therefore of good thickness and is hatched or crossed with lines to give a bond for the next coat. The first coat is allowed to dry thoroughly; the second coat is floated over the first, and rubbed well in with a flat board, about 12 inches square, to bring it all to a fair and equal surface; and before the second coat has thoroughly dried, the third or finishing coat is applied in finer materials and more liquid state. In ceiling cornices, moldings, etc., plaster of Paris or stucco is generally used: this sets or hardens more rapidly than lime, and has a finer and whiter surface. Ornaments (called enrichments) are generally of plaster of Paris, and cast in molds. They are then set in their places after the cornice has been made, or *run*.

PLAS'TERS: class of medicinal agents employed externally with various objects. They are solid and tenacious compounds, adhesive at the ordinary temperature of the body, and owing their consistency—1, To the chemical combination of oxide of lead, with one or more fatty acids; or 2, to due admixture of wax, or fat and resin; or 3, to the chemical action of the component parts of the plaster on each other. Strictly, the term *Plaster* should be restricted to the first class of compounds; viz., to combination of oxide of lead with fatty acids. Among plasters in more or less common use are: ammoniac and mercury plaster, belladonna plaster, cantharides plaster, chalybeate plaster, galbanum plaster, litharge (or lead) plaster, mercurial plaster, opium plaster, pitch plaster, resin plaster, soap plaster. The litharge (or lead) plaster directly or indirectly enters into the composition of those mentioned, except those of ammoniac and mercury, cantharides, and pitch. *Lead Plaster*, usually sold under the name *Diachylon*, in combination with resin, constitutes the ordinary *adhesive plaster*. The best plaster of this kind for strapping is composed of a mixture of six drachms of resin with a pound of lead plaster. The *cantharides plaster* and the *ammoniac and mercury plaster* are examples of the second and third varieties.

Plasters are kept generally in rolls; and when they are to be used, they are melted at a temperature of not more than 212°, and spread on cloth. They are employed to answer two distinct indications; namely, to act *mechanically*, as by affording artificial support to weak muscular structures, by preventing threatened or tedious excoriations, by protecting parts already excoriated from the action of the air, etc.; and to act *medicinally* as stimulant, alterative, anodyne, etc.

PLASTIC, a. *plăs'tĭk* [F. *plastique*, plastic: L. *plasti-*

cus; Gr. *Plastĭkos,* suitable for being fashioned or formed —from *plassō,* I form or mold]: susceptible of being molded or modelled, as clay; having power to give form to matter; pertaining to modelling; produced by, or appearing as produced by, molding or modelling. PLASTICITY, n. *plăs-tĭs'ĭ-tĭ* [F. *plasticité*]: capacity of being molded. PLASTIC ART, the art of representing figures in sculpture, or by modelling in clay. PLASTIC CLAY, the clay used by potters. PLASTOGRAPHY, n. *plăs-tŏg'ră-fĭ* [Gr. *graphē,* a picture]: the art of forming figures, etc., in plaster. PLASTIC ELEMENT, an element which contains the germ of a higher form. PLASTIC FORCE, the force which gives to matter a definite organic form.

PLASTIDS: a name given to living organs of the cell which in various forms are usually imbedded in the cytoplasm and whose functions differ in accordance with the manner in which they may ultimately develop. There are three kinds—the chloroplasts which are of a yellow-green appearance due to the presence of chlorophyll and carotin; chromoplasts with a red or yellow color; and the leucoplasts which are colorless, but which form starch grains, proteid granules, or oil drops, from material absorbed from the adjacent protoplasm. See CHROMATOPHORE.

PLASTRON, n. *plăs'trŏn* [F. *plastron,* a breastplate—from It. *piastrone*]: a piece of stuffed leather or other substance used by fencers as a protection to the body against thrusts; that part of the bony covering of turtles and tortoises belonging to the under surface; a variously shaped ornament for the front of a lady's dress, of a different material from the dress itself. PLASTRON DE FER, n. *dė fėr,* in *old armor,* an iron breastplate, worn beneath the knight's hauberk as an additional protection, as well as to prevent the friction or pressure of the ringed plates.

PLAT, n. *plăt* [from PLAIT, which see]: straw-plait, a braid: V. to weave; to form by intertexture. PLAT'TING, imp. PLAT'TED, pp. PLAT'TER, n. *-ėr,* one who plats.

PLAT, n. *plăt* [*Ger. platz,* an open space; Dut. *plot;* F. *plat;* Gr. *plătus,* broad, flat; Bav. *platten,* a bare spot in a wood]: a small piece of flat or even ground; in *masonry,* a broad flat stone forming a step or landing-place before a door: ADJ. flat or even. PLAT'BAND, a border of flowers in a garden; in *arch.,* a flat rectangular molding whose projection is less than its breadth.

PLATA, n. *plâ'ta* [Sp.]: silver. PLATA-AZUL, n. *-a-thûl',* in *mineral.,* Mexican name for a rich ore of silver.

PLA'TA, LA. See LA PLATA; ARGENTINE REPUBLIC.

PLATA, *plâ'tâ,* RIO DE LA, or PLATE RIVER: wide estuary of S. America, between Uruguay on the n. and the Argentine Confederation on the s.; forming the mouth of the Parana (q.v.) and the Uruguay (q.v.) It is 200 m. long, 29 m. broad at Buenos Ayres, and 140 m. broad at its mouth between Maldonado and Cape San Antonio. At

its mouth it is, on an average, only about 10 fathoms deep, at Monte Video it is only 3 fathoms; and at Buenos Ayres about 16 ft. deep. Some conception of the vast volume of water which this estuary carries to the Atlantic may be had when it is remembered that with its affluents it drains an area of 1,250,000 sq. m. The strong and irregular currents, and the sudden tempests of the La P., render its navigation extremely dangerous. It is estimated that through this estuary about one-fourth of the produce of South America is brought to market. For the navigation of its affluents, see PARAGUAY: PARANA: URUGUAY.

PLATÆA, *plâ-tē'a*, or PLATÆÆ, *plâ-tē'ē:* city in the w. part of Bœotia, on the borders of Attica, at the foot of Mount Cithæron. It was about 6½ m. from Thebes. B.C. 480 it was destroyed by the Persians, because the inhabitants had taken part with Athens in the battle of Marathon; but in the following year it was the scene of the glorious victory won by the Lacedæmonian Greeks, under Pausanias and Aristides, over the Persian hordes commanded by Mardonius—a victory that finally delivered Greece from the threatened yoke of the invader. In the third year of the Peloponnesian war, B.C. 429, it was attacked by a Theban-Lacedæmonian force—for the Platæans were firm friends of Athens—and heroically defended itself more than two years, until it was starved into surrender. The little garrison of about 200 men were put to the sword, and the city was razed to the ground. Such of the Platæans as escaped were hospitably received at Athens. By the treaty of Antalcidas B.C. 387, their children were allowed to go back again, and rebuild their city, after an exile of 40 years; but they were again driven out by their implacable enemies, the Thebans; and half a century elapsed before the victory of Philip of Macedon at Chæroneia enabled the Platæans finally to return to their homes. After this, the city remained inhabited, probably till the latest days of the empire. It is mentioned in the 6th c. after Christ. Some ruins of P. are still visible near the village of *Kokhla.*

PLATA'LEA: see SPOONBILL.

PLATANE, n. *plăt'ān* [L. *platănus*, the plane-tree]: the plane-tree, which see.

PLATE, n. *plāt* [F. *plat*, flat, plain: Ger. *platte*, a plate: Gr. *plătus*, flat, level]: a body with a flat and extended surface; a dish; a flat shallow vessel of earthenware, etc., used at table for eating from; a sheet of metal; an engraved flat piece of metal, or the engraving printed from it; articles for domestic use in gold or silver [Sp. *plata*, silver—name originally given to the thin plates of silver worked by silversmiths, then to the metal itself]: a prize at a race, as the 'queen's plate'; a mining term for compact beds of shale which break up into thin plates; in *arch.*, the piece of timber which supports the ends of the rafters: in *her.*, a Roundel (q.v.) argent. It is represented flat, and in the heraldry of Scotland is known as a *Bezant argent:* V. to coat with a more valuable metal, as copper with silver; to

overlay or cover. PLAT'ING, imp.: N. the act or art of covering with a thin coat of a more valuable metal, usually silver; the coating or layer so formed (see below). PLAT'ED, pp.: ADJ. covered with a coating of metal, as silver, covered or armed with sheets of metal. PLAT'ER, n. *-ĕr*, one who plates. PLAT'Y, a. *-ĭ*, like plate. PLATEFUL, n. *plāt'fŭl*, enough to fill a plate; as much as a plate can contain. PLATTER, n. *plăt'tĕr*, a large flat dish for holding the provisions of a table. PLATE-ARMOR, armor in plates, as distinguished from mail. ARMOR-PLATING, the thick plates or slabs of rolled iron which form the sides of a man-of-war. PLATE-GIRDER, a girder formed of a single plate of metal, or of a series of plates joined together. PLATE-GLASS, glass cast into plates or sheets when in a liquid state, and ground and polished. PLATE-LAYER, a workman who lays down and fixes the rails of a railway, and keeps them in order. PLATE-MARK, figure or emblematic design stamped on gold or silver plate to indicate the value of its metal, etc. (see PLATE-MARKS). PLATE-PAPER, a thick spongy paper manufactured for printing from engraved plates. PLATE-RACK, a wooden frame or stand for plates and dishes in a kitchen or scullery. PLATE-WARMER, a metal case with shelves for warming plates before a fire.

PLATE RIVER: see PLATA, RIO DE LA.

PLATEAU, n. *plă-tō'*, plu. PLATEAUX', *-tōz'* [F. *plateau*, table-land; *plat*, flat]: any elevated and comparatively flat surface of land of some extent; a table-land, or high level region.

PLATE'-MARKS: legal impressions made on articles of gold or silver at the various assay offices in Great Britain, for indicating the true value of the metal of which the articles are made: see ASSAY: GOLDSMITHS' COMPANY. There is no such legal usage in the United States.—The marks are a series of symbols, embossed in a line about three-quarters of an inch in length, and usually on every separate piece of which an article is composed. These symbols are—1. The maker's own mark or initials. 2. The standard or assay mark; viz., *for gold*, a crown, and figures denoting the number of carats fine. This means that pure gold is reckoned at 24 carats, and every part of alloy added reduces that standard number (see CARAT); so that if a piece of gold-plate or jewelry is marked with a crown and 18, it indicates that it consists of 18 parts of pure gold, and 6 parts of some other metal alloyed with it. Gold of nine carats is now legal in Britain, but as it is marked by the assay office, there can be no deception, if the public understand the plate-marks. If not, they may pay for pure gold, relying on the hall-mark, when they receive only about a third part gold. *For Silver*—England, a lion passant; Ireland, a harp crowned; Edinburgh, a thistle; Glasgow, a lion rampant. 3. The hall-mark of the district office—London, a leopard's head crowned; York, three lions and a cross; Exeter, a castle with two wings; Chester, three wheat-sheaves or a dagger; Newcastle, three castles; Birmingham, an anchor; Sheffield, a crown; Edinburgh, a castle and lion; Glasgow, a tree, sal

mon, and ring; Dublin, the figure of Hibernia. 4. The duty-mark, indicating the payment of duty, viz., the head of the reigning sovereign. 5. Each office has also its alphabetical date-mark. In London, the assay year, which commences May 30, is indicated by one of the first 20 letters of the alphabet. The Goldsmiths' Company of London have marked thus:

1716 to 1756, Roman Capital Letters.
1756 " 1776, Roman Small Letters.
1776 " 1796, Old English Letters.
1796 " 1816, Roman Capital Letters **A** to **U**.
1816 " 1836, Roman Small Letters a to u.
1836 " 1856, Old English Letters 𝔄 to 𝔘.
1856 " 1876, Small Black Letters 𝔞 to 𝔲.
1876 onward, Roman Capitals, distinguished from former series by shape of shield on which they are imprinted.

Thus, 𝔈 𝔊 𝔍 𝔓 𝔰 would represent the mark on Elkington's plate, made 1874.

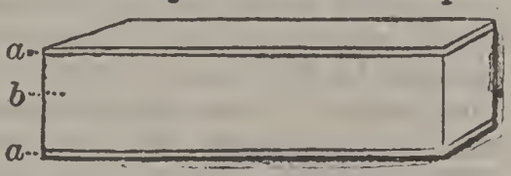
PLATEN, n. *plăt'ĕn* [Ger. *platte;* Dut. *plat;* F. *plat,* broad, flat]: among *printers,* the flat part of a press by which the impression is made.

PLATE'-POWDER: composition for cleaning gold and silver plate and plated articles; called also Rouge-powder (see ROUGE). It is made by levigating rouge with three times its weight of prepared chalk, until they are thoroughly mixed into an almost impalpable powder. Sometimes Putty-powder (q.v.) is used instead of rouge, and a little rose-pink added to color it. A plate-powder is made sometimes also by levigating quicksilver with 12 times its weight of prepared chalk, until it is thoroughly incorporated, and forms a gray powder. It puts a remarkable brilliancy on silver-plate, but is very injurious to it.

PLATFORM, n. *plăt'fawrm* [F. *plate-forme;* It. *piatta-forma;* Dut. *platte-forme;* L. *planus,* and *forma:* Eng. *plat,* and *form*]: in *OE.,* a terrace; a scheme; a plan; a raised level space, natural or artificial; any level scaffold or floor of timber raised above the usual level; the flat roof of a building on the outside; the place where guns are mounted on a fortress or battery; the raised part at a railway station for landing passengers and goods; the place set aside for the speakers at a public meeting, raised above the floor; in America, a plan or scheme of united action, as in politics, or for subserving party or sectarian purposes; a declaration of principles to which the adhesion of a party is declared—each principle or proposal forming a *plank* in the *platform.*

PLAT'ING: covering an inferior metal with one of the precious metals, the object being to give the appearance of silver or gold to articles intended chiefly for table use. At present, the articles are generally of German silver or some of the similar white-metal alloys; but formerly, copper, or an alloy of that metal with brass, was used; the disadvantage of which was that, as the coating of silver

wore off, the red color of the copper became disagreeably apparent through the thin covering of silver. Gold is plated rarely on any other metal than silver, except for purposes of deception. Previous to the introduction of electro-plating, the usual method was that named *Sheffield-plating*, from the extent to which it was carried on in that town. It consists in soldering on to one or both sides of an ingot of the baser metal, a thin plate of silver. The ingot is always oblong shape, and is most carefully prepared on the surfaces which are to receive the silver, so that nothing shall prevent the complete union of the two. The shape and relative proportions of the ingot, and its plating of silver, are seen in the figure: *aa* is the silver on the upper and lower surfaces, for double-plated goods; *b*, the body of the ingot, of copper or white-metal alloy. The soldering is a process requiring much care and nicety: the plates of silver are thinly coated with a concentrated solution of borax, and are then applied to the prepared surfaces of the ingot, to which they re firmly bound with iron wire, and then placed in the *plating-furnace*, and subjected to a strong heat. This furnace is so arranged that the interior can be constantly watched, and when the proper temperature is attained, the workman knows the exact instant to withdraw it. The act of soldering is almost instantaneous, and fusion would immediately follow, if the ingot was not quickly withdrawn. When cooled, the wire is taken off, and the ingot is taken to the rolling-mill, where it is passed forward and backward, of course with the silver above and below, until it is rolled out into a sheet of the exact thickness required. However thin it may be made, it is found that the relative thickness between the ingot and its layers of silver is always the same. As usual, in all cases of rolling or striking metal, annealing from time to time is necessary, to remove the brittleness which these operations cause. This method does not admit manufacture of any portions such as ornamental molded borders, etc.; these had therefore to be formed separately of copper, and were coated by the process called *Silvering* (q.v.). Now, however, it is found better to make them of silver rolled thin, and fill them inside with lead, to give them solidity; by this plan is avoided the annoyance of the silver rubbing off, and exposing the copper. Sheffield-plating is still made extensively, but the manufacture is rapidly declining in presence of the newer art of electro-plating; in which by remarkable processes discovered in recent years, the deposit is made not only of silver and gold, but also of aluminium, silicium, titanium, tungsten, molybdenum, tin, cadmium, lead, bismuth, palladium, rhodium, iridium, and the alloys brass and bronze. The plating with the alloys is far the most important—e.g., the covering such a material as cast-iron with a material so ornamental as bronze. See ELECTRICITY.



PLATINUM, n. *plăt'ĭ-nŭm*, or PLAT'INA, n. *-nă* [Sp. *platina*, platinum—from *plata*, silver, in allusion to its color]: metal of grayish-white color, very valuable for hardness, infusibility, and its resistance to the action of air and moisture—it is also ductile, malleable, of great tenacity, and one of the heaviest of known metals (see below). PLATINIZE, v. *plăt'ĭ-nīz*, to coat or plate with platinum. PLAT'INIZING, imp. PLAT'INIZED, pp. *-nīzd*. PLATINUM-BLACK, metallic platinum in a finely divided state. PLATINIFEROUS, a. *plăt'ĭn-ĭf'ĕr-ŭs* [L. *fero*, I produce]: producing platina. PLATINOIDS, n. plu. *plăt'ĭn-oydz* [Gr. *eidos*, appearance]: a term applied to those metals found associated with platina.—*Platinum* was first brought to the notice of the civilized world by the Spanish traveler Ulloa, who obtained it from the goldbearing sands of the river Pinto, near Popayan, Colombia, in 1735. Watson extracted the metal, in 1741, from the silvery sand that was sent him from this source, and gave it the name 'platinum.' In 1822 platinum was found in Russia, in the alluvial deposits of the Ural district; and it is from the Urals that the greater part of the commercial supply is now obtained, though a portion of it comes from South America and from Borneo.

Platinum almost invariably occurs in nature in the free or uncombined state, usually alloyed with iridium, osmium, iron, and other metals. Many specimens of native platinum are magnetic, and some even exhibit polarity, like the lodestone; those which are polarized being usually (but not invariably) alloyed with an uncommonly high percentage of iron. Several methods are known for separating platinum from the other metals with which it occurs in nature, but for these reference must be made to the more extended treatises on chemistry and metallurgy.

Pure platinum, when in the compact state, is a white, silvery metal, somewhat softer than copper, very malleable and ductile, and capable of receiving a high polish. It has a specific gravity of about 21.5, and is therefore one of the heaviest substances known. Its specific heat is 0.032, and its coefficient of linear expansion (Fahrenheit scale) is about 0.0000049. On account of the close equality of this last constant to the coefficient of expansion of glass, platinum wires are almost universally employed in the manufacture of incandescent electric lamps, for leading the electric current through the glass to the carbon filament within. A conductor having a coefficient of expansion materially different from that of glass could not be successfully used for this purpose, since the differential expansion between the conductor and the surrounding glass, as the lamp becomes alternately heated and cooled in its service, would inevitably result in a leakage where the wire passes through the glass; and the external air, entering the bulb, would destroy the vacuum and hence bring about the destruction of the filament also. On account of the high cost

of platinum, many attempts have been made to discover a successful substitute for it, in the manufacture of electric lamps. No demonstrably satisfactory substitute has yet been found; but it is quite likely that one of the alloys of nickel and iron, with which experiments are now being made, will ultimately replace the platinum in this application. The electrical resistance of a platinum wire is from 10 to 12 times as great as that of a silver wire of the same dimensions. Platinum melts at about 3,200° F., and for its fusion the highest temperature of the oxy-hydrogen flame is required. When melted, the metal does not oxidize; but it absorbs oxygen gas, which it gives off again upon rapid cooling, with a curious 'spitting' action. At a dull red heat platinum also absorbs hydrogen gas readily; Berliner stating that platinum foil that has been carefully cleaned and free from gases will absorb no less than 200 times its own volume of hydrogen, and 80 times its own volume of oxygen. These absorbed gases are retained so powerfully that they cannot be entirely removed except by heating the metal strongly in a vacuum. Hydrogen will also pass through platinum foil easily at a red heat, even when the foil is more than one millimetre (that is, 1-25th inch) thick.

Chemically, platinum has the symbol Pt, and an atomic weight of about 194.8. It is not attacked by oxygen, nor by pure hydrochloric, nitric, or sulphuric acid. For this reason, and also on account of its comparative infusibility, it is greatly used in the laboratory in the form of crucibles and other apparatus; and when alloyed with iridium it is also employed in the construction of standard weights and measures, the alloy with iridium being harder than pure platinum, and hence less liable to injury from wear or from accident. Alkaline substances attack platinum to some extent, their action being most rapid at high temperatures. Chlorine also acts upon it, and for this reason electrodes of platinum are seldom used in the electrolysis of solutions of common salt. Platinum may be successfully used even for this purpose, however, if the metal is quite pure, and the electrodes are kept scrupulously clean.

The most important simple salt of platinum is the tetrachloride, $PtCl_4$. In the preparation of this substance metallic platinum is first dissolved in the mixture of nitric and hydrochloric acids known as 'aqua regia,' and the solution is evaporated. The crystals which are thus obtained have the composition $H_2PtCl_6 \times 6H_2O$, and the substance H_2PtCl_6 (which has acid properties) is known as 'chloroplatinic acid.' Its hydrogen atoms are each replaceable, and the salts are formed by replacing them by bases known as the 'chloroplatinates' of these bases.

When the crystals that are obtained as described above are allowed to stand over caustic potash for a sufficient time, they lose four molecules of their water of crystal-

lization; and if the residue is then heated in chlorine gas to about 650° F., it parts with the elements of hydrochloric acid, and becomes reduced to platinum tetrachloride, $PtCl_4$. The pure tetrachloride is brown in color, and is readily soluble in water. Chloroplatinic acid is very often (though incorrectly) called 'platinum tetrachloride,' and in certain of their laboratory applications the two can be used almost interchangeably. When ammonium chloride, NH_4Cl, is added to a solution of platinum tetrachloride, ammonium chloroplatinate, $(NH_4)_2PtCl_6$, is precipitated. Many other compounds of platinum with ammonium are also known, but their chemistry is too complicated for present consideration. Chloroplatinates of the metals of the alkalies, analogous in composition to ammonium chloroplatinate, are easily obtained, and some of them are important in the laboratory. Potassium and sodium, for example, are so similar in their chemical deportment that they can be separated only with much difficulty unless they are at first brought into the form of chloroplatinates. If a solution of the mixed chlorides of sodium and potassium is added to a solution of platinum tetrachloride, the chloroplatinates of sodium and potassium are formed, their compositions being analogous to that of the chloroplatinate of ammonium, just given. The chloroplatinate of sodium is readily soluble, and remains in solution; while the corresponding salt of potassium is nearly insoluble, and is therefore precipitated. Three oxides of platinum have been prepared by indirect methods, but none of them is of any considerable importance. Platinum does not readily form salts (save in the case of its halogen compounds) by replacing the typical hydrogen atoms of acids; and when it occurs in combination, it is more commonly found in the acid radical of the salt (as in the case of the chloroplatinates) than in its positive radical.

'Platinum black' is merely metallic platinum in a state of minute subdivision. It may be prepared in various ways. According to the one method, ordinary platinum is first melted with twice its own weight of zinc, and the alloy so produced (which is very brittle) is finely pulverized. The zinc is then dissolved away by the action of sulphuric acid, and the residue, after washing with very dilute nitric acid, consists of nearly pure platinum in the desired state of subdivision. Platinum black (which takes its name from its color) absorbs oxygen with great facility, taking up (according to Liebig) as much as 800 times its own volume of that gas. The oxygen so absorbed may be utilized for effecting the oxidation of organic substances, and for this reason platinum black is greatly used in organic chemistry. 'Spongy platinum' is pure metallic platinum in a porous or spongy condition, and may be conveniently prepared by igniting the chloroplatinate of ammonium. It is gray in color, and (like platinum black) it pos-

sesses the power of absorbing gases to a remarkable extent. A jet of hydrogen gas, when directed against a fragment of spongy platinum, is absorbed so energetically that the heat that is developed is sufficient to ignite the jet.

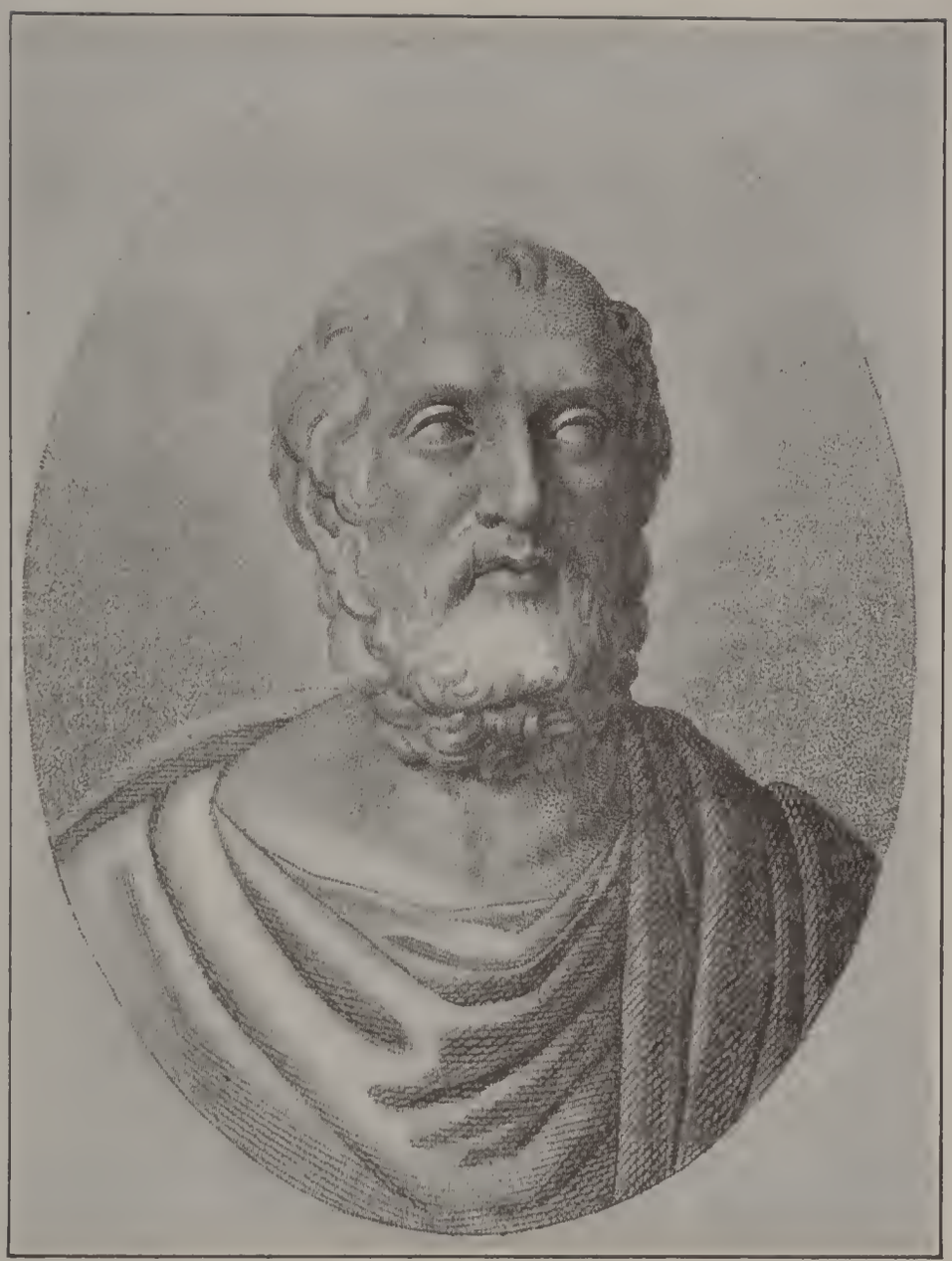
PLATITUDE, n. *plăt'ĭ-tūd* [F. *platitude*, flatness—from *plat*, flat]: dulness; insipidity; that which exhibits flatness or dulness. PLAT'ITUDES, n. plu. *-tūdz*, weak, empty, trite or stupid remarks.

PLATO, *plā'to:* philosopher, who, with Aristotle, represents to modern Europe the whole compass of Greek speculation: B.C. 429—B.C. 348; b. Athens, shortly after the commencement of the Peloponnesian war; son of Ariston. His real name was Aristocles. His birth was in the same year in which Pericles died; and his literary activity may be assigned to the first half of B.C. 4th c. He was of good family, being connected, on the mother's side, with Solon; and on the father's side, with Codrus, one of the ancient kings of Athens. He received a good education, according to the common practice of the Greeks, in music, gymnastics, and literature. His rich and gorgeous imagination is said to have essayed its powers at first in poetry; but when about 20 years of age, having become acquainted with Socrates, he threw all his verses into the fire, and devoted his great intellect to philosophy. When he was 20 years old, the political troubles, of which the death of Socrates was only one terrible symptom, forced him to leave Athens for a season, and he resided at Megara, with Euclid, founder of the Megaric sect. The disturbed state of his native country, doubtless, also was one cause of the frequent travels which he is reported to have made. Of these, his three visits to Sicily, during the time of the elder and younger Dionysius, are most famous and best authenticated. That he visited Italy is extremely probable; at all events, he was most closely connected with Archytas and the Pythagorean philosophers; though, as Aristotle (*Metaph.* i. 6) justly remarks, he borrowed from Heraclitus as well as from Pythagoras, and put a stamp of freshness and originality on all that he borrowed. After returning from his first visit to Sicily, being then in his 40th year, he began teaching philosophy publicly, in the Academeia, a pleasant garden in the most beautiful suburb of Athens, and there gathered around him a large school of distinguished followers, who maintained a regular succession after his death, under the name Philosophers of the Academy. He lived to the age of 80; was never married; and must have possessed some independent property, as he expresses himself strongly against teaching philosophy for fees, and we nowhere read of his having held any public office from which he could have derived emolument. These are the few facts known as to the life of Plato.

The principles of his philosophy are happily better

known; for all his great works have been preserved, and have always been extensively read wherever the Greek language has been known. The distinctive character of the Platonic philosophy is expressed by the word idealism as opposed to realism, materialism, or sensationalism—using these words in their most general and least technical sense. The philosophy of Plato is often regarded as essentially poetical and so in a sense it is. It is, at the same time, however, a scientific philosophy, for the purest science, e.g., mathematics—on which philosophy is well known to have placed the highest value—is a science of ideas; and, above all, it is essentially a moral and a theological philosophy, for practice, or action, is the highest aim of man, and morality is the ideal of action; and God, as cause of all, is the ideal of ideals, the living essence of supreme power, virtue, and excellence to which all contemplation recurs, and from which all action and original energy proceed. The distinctive excellence of the Platonic philosophy is identical with its distinctive character, and consists in that grand union of abstract thought, imaginative invention, emotional purity, and noble activity, which is the model of a complete and richly endowed humanity. The poetical element in philosophy, so wonderfully combined with the analytical, shows itself not only in those gorgeous myths which form the peroration of some of his profoundest dialogues, but in that very dialogic form itself, of which the situation is often extremely dramatic; though this form of philosophic discussion perhaps owes its existence more to the lively temper and out-of-door habits of the Greeks than to the special dramatic talent of Plato. On the other hand, the defects of the Platonic philosophy arise from its essential one-sidedness, as a polemical assertion of the rights of thought against the claims of the senses, of the stability of the eternal type against the constant change that characterizes the ephemeral form. In his zeal to submit all that is external to the imperatorial power of internal conception, the philosopher of ideas is apt to forget the obstinate and unpliable nature of that external world which he would regulate; and after projecting a grand new scheme of society, according to what appears a perfect model, he appears like the architect who, after drawing out the model of a marble temple, finds that he has only bricks with which to build it. For this reason, extremely practical men, and those who are compelled to reason chiefly by an extensive induction from external facts, have ever felt an instinctive aversion to the Platonic philosophy; and Plato himself, by some of the strange and startling conclusions, in matters of social science, to which his ideal philosophy led, has, it must be confessed, put into the hands of his adversaries the most efficient weapons by which his ideal system may be combated.

The starting-point of the Platonic philosophy, is the



PLATO.

theory of knowledge. This is set forth in the *Theætetus*, the *Sophistes*, and the *Parmenides;* and in the *Cratylus*, the foundations are laid for a science of language, as the necessary product of a creature energizing by ideas. The Platonic theory of knowledge, as developed in the *Theætetus*, will be most readily understood by imagining the very reverse of that which is vulgarly attributed to Locke—viz., by drawing a strong and well-marked line between the province of thought and that of sensation in the production of ideas, and by taking care that, in the process of forming conceptions, the mind shall always stand out as the dominant factor. In other words, the hackneyed simile of the sheet of blank paper, applied to the mind by extreme sensational philosophers, must either be thrown away altogether or inverted; the more active part of the operation must always be assigned to the mind. The formation of knowledge, according to Plato, may be considered the gradual and systematic elimination of the accidental and fleeting in the phenomenon from the necessary and permanent; and the process by which the mind performs this elimination—and it can be performed only by mind—is called *Dialectics*. This word, from *dialégomai*, originally signifies only conversational discussion; thence, that discussion conducted in such scientific fashion as to lead to trustworthy results, i.e., strictly logical. The product of dialectics is ideas, and these ideas being the forms or types of things which are common to all the individuals of a species, all the species of a genus, all the genera of a family, and all the families of a class, generate classification—i.e., knowledge of the permanent in phenomena—and definition, which is merely the articulate verbal expression of this permanency. The construction of the confused results of observation into the orderly array of clear conceptions, by a sort of cross-examination of the phenomena, performed by minds impassioned for truth, is exhibited as the great characteristic of the teaching of Socrates, in the *Memorabilia* of Xenophon. In the dialogues of Plato, the same purification of the reason, from the clouds of indistinct sensuousness, is exhibited on a higher platform and with more comprehensive results. For between Socrates and Plato, notwithstanding a deep internal identity, there was this striking difference in outward attitude—that Socrates used logic as a practical instrument in the hands of a great social missionary and preacher of virtue; while Plato used it as the architect of a great intellectual system of the universe, first for his own time and his own place, but, as the event has proved, in some fashion also for all times and all places.

We should err greatly, however, if we looked on Plato as a man of mere speculation. Neither Plato nor any of the great Greeks looked on their intellectual exercises and recreations as an end in themselves. With them, philosophy did not mean mere knowledge or mere specu-

lation, but it meant wisdom, and wisdom meant wise action, and wise action meant virtue. The philosophy of Plato, therefore, with all its transcendental flights, of which we hear so much, was essentially a practical philosophy; all his discussions on the theory of knowledge and the nature of ideas are undertaken mainly that a system of eternal divine types, as the only trustworthy knowledge, may serve as a foundation for a virtuous life, as the only consistent course of action. Virtue, with Socrates and Plato, is only practical reason. As in the Proverbs of Solomon, all vice is folly, so in the philosophy of Plato, the imperial virtue is *phronēsis*—i.e., 'wisdom' or practical 'insight.' The other two great Greek and Platonic virtues—*sōphrosynē*, 'moderation' or 'soundmindedness,' and *dikaiosynē*, 'justice,' or the assigning to every act and every function its proper place—are equally exemplifications of a reasonable order applied to action—such an order as alone and everywhere testifies the presence of mind. The theory of morals as worked out from such principles is, of course, as certain as the necessary laws of the reason which it expresses; and accordingly, the Platonic morality, like the Christian, is of that high order which admits no compromise with ephemeral prejudice or local usage. The contrast between the low moral standard of local respectability and that which is congruous with the universal laws of pure reason, stands out as strikingly in Plato, as the morality of the Sermon on the Mount in the Gospels does against the morality of the Scribes and Pharisees. Splendid passages to this effect occur in various parts of Plato's writings, particularly in the *Republic* and the *Gorgias*. In perfect harmony with the Platonic theory of noble action is his doctrine with regard to pure emotion and elevated passion. Love with Plato is a transcendental admiration of excellence—an admiration of which the soul is capable by its own high origination and the germs of godlike excellence, which are implanted in it from above. The philosophy of love is set forth with imaginative grandeur in the *Phœdrus*, and with rich dramatic variety in the *Symposium*, of which dialogue there is an English translation by Shelley. The philosophy of beauty and the theory of pleasure are set forth with great analytic acuteness in the *Philebus*. With Plato, the foundation of beauty is a reasonable order, addressed to the imagination through the senses—i.e., symmetry in form, and harmony in sounds, the principles of which are as certain as the laws of logic, mathematics, and morals—all equally necessary products of eternal intellect, acting by the creation and by the comprehension of well-ordered forms, and well-harmonized forces, in rich and various play through the living frame of the universe; and the ultimate ground of this lofty and coherent doctrine of intellectual, moral, and æsthetical harmonies lies in Plato's system, where alone it can lie, in the unity of a

supreme, reasonable, self-existent intelligence, whom we know as the living God, the fountain of all force, and the creator of all order in the universe; the sum of whose most exalted attributes, and the substantial essence of whose perfection may, as contrasted with our finite and partial aspects of things, be expressed by the simple term *tò agathôn*—the GOOD. From this supreme and all-excelling intelligence, human souls are offshoots, emanations, or sparks, in such a fashion, that they partake essentially of the essential character of the source from which they proceed, and accordingly possess unity as their most characteristic quality, attest their presence everywhere by a unifying force which acts by impressing a type on whatever materials are submitted to it, and is filled with a native joy in the perception of such types, the product of the same divine principle of unity, wheresoever presented. The undivided unity and unifying force which we call the soul is immortal, being from its nature altogether unaffected by the changes of decay and dissolution to which the complex structure of the material human body is exposed. The doctrine of the immortality of the soul is most fully set forth in the *Phœdo*, a dialogue which combines with the abstract philosophical discussion a graphic narrative of the last hours of Socrates, which, for simple pathos and unaffected dignity, is unsurpassed by any human composition.

The most complete and systematic exhibition of the opinions of Plato is in the *Republic*, or ideal commonwealth, of which an excellent English translation has been recently made by Davies and Vaughan. The *Republic* is not, as the title would lead us to suppose, a political work, like the *Politics* of Aristotle. It is, as Baron Bunsen well remarked, not so much a state as a church with which this great work has to do; or at least, both a state and a church; and the church is the superior and dominating element. In the *Republic*, accordingly, we find the necessity of virtue to the very idea of social life proved in the first book; then the whole process of a complete moral and scientific education is set forth with such fulness as to throw the strictly political part of the book, including the germs of what is now called political economy, very much into the shade. The principles and government of an ideal moral organism, of which the rulers shall be types of fully developed and perfectly educated men, is the real subject of the *Republic*, which accordingly forms a remarkable contrast to the inductive results of the thoroughly practical work of Aristotle on the same subject. Plato's commonwealth is a theoretical construction of a perfect ideal state of society; Aristotle's is a practical discussion on the best form of political government possible under existing conditions. Of the value of Plato's work, both suggestively in the world of politics, and dogmatically in the region of moral and religious specula-

tion, there can be no doubt; but as a practical treatise on politics, it is vitiated throughout, both by its original scheme and by an inherent vice in the author's mind, which prevented him from recognizing the force of the actual in that degree which necessarily belongs to such a complex art as human government. Of this fault, the author was himself sufficiently conscious, and has accordingly, in another large political treatise, the *Laws*, endeavored, for practical purposes, to make some sort of compromise between the transcendental scheme of his *Commonwealth* and the conditions of existing society. But however he might modify individual opinions, there was a one-sidedness about Plato's mind, which rendered it difficult for him to struggle successfully with the difficulties of complex practical politics. He was too much possessed with the idea of order, and, moreover, had planted himself with too manifest a polemical attitude against Athenian democracy, to give due weight to the opposite principle of freedom, proved by experience to be so indispensable to every vigorous political development.

Physical science, in the days of Plato, stood on no basis sufficiently sure or broad to authorize a philosophy of the material universe with any prospect of success. Nevertheless, in his *Timæus*, the great philosopher of ideas has attempted this; and it is a work which, however valueless in the face of the results of modern chemical and kinetical research, will ever be consulted with advantage as a constructive summary of the most important facts and theories of nature known to the Greeks, previously to the accurate observations of Aristotle, and the extended mathematics of the Alexandrian school. The great question as to what matter is, and whence, Plato nowhere seems to settle clearly; but the general tendency of ancient thought was toward a dualism, which recognized the independent existence of a not very tractable element called matter, in which Plato seems to have acquiesced.

The works of Plato were extensively studied by the church Fathers, one of whom joyfully recognizes, in the great teacher of the Academy, the schoolmaster who, in the fulness of time, was destined to educate the heathen for Christ, as Moses did the Jews. A lofty passion for Plato likewise seized the literary circle of the Medici at the period of the revival of letters in Italy. Since that time, the tyrannous sway of Aristotle, characteristic of the middle ages, has always been kept in check by a strong band of enthusiastic Platonists in various parts of Europe. The Cambridge Platonists illustrate this movement, e.g., Cudworth (q.v.). Since the French Revolution particularly, the study of Plato has been pursued with renewed vigor in Germany, France, England, and the United States; and many distinguished English authors, without expressly professing Platonism—e.g., Coleridge, Wordsworth, Mrs. Browning, Ruskin, etc.—

have formed a strong and growing party of adherents, who could find no common banner under which they could at once so conveniently and so honorably muster as that of Plato. The amount of learned labor expended on the text of Plato, during the 19th century, has been in proportion; and in this department the names of Bekker, Ast, and Stallbaum stand pre-eminent. Prof. Jowett also, in Oxford, has made Plato his standard author for many years; from his hand came 1871 a translation of the *Dialogues of Plato*. Mr. Grote, the historian of Greece, published his *Plato and the Other Companions of Socrates*, 1864. One of the best accounts of the Platonic philosophy is given in Zeller's *Phil. der Griechen*, of which the part on *Plato and the Older Academy* was translated 1876. See also Gomperz, *Greek Thinkers*. Platonism has found in the United States also profound students and interesting advocates.

PLATOFF, *plâ'tof*, Matvei Ivanovitch, Count: Hetman of the Cossacks of the Don, and a Russian cavalry general: 1757, Aug. 6—1818; b. on the banks of the Don, of an ancient and noble family which had emigrated from Greece. Having acquired reputation for wisdom and bravery, he was appointed by Czar Alexander I. Hetman of the Cossacks; and subsequently as a lieut. gen. in the Russian army, and afterward as commander of the Russian irregular cavalry, he was prominent in the wars with France and Turkey. After the French had evacuated Moscow, and retreated, Platoff hung upon their rear with utmost pertinacity, wearying them out by incessant attacks, cutting off straggling parties, capturing their convoys of provisions, and keeping them in continual apprehension. The French historians state that Bonaparte's army suffered more loss from the attacks of Platoff's Cossacks than from privation and exhaustion. He defeated Lefebvre at Altenburg. After the rout of the French at Leipzig, he inflicted great loss on them in their retreat, and subsequently gained a victory over them at Laon. The inhabitants of Seine-et-Marne will long remember the devastations and pillage of his undisciplined bands. He was enthusiastically welcomed by the Parisians (to their shame), also by the English, who presented him with a sword of honor on his visit to London in company with Marshal Blücher. The allied monarchs loaded him with honors and decorations, and the czar gave him the title count. He retired to his own country, and died near Tcherkask. No other Russian gen. ever exercised such influence over his soldiers.

PLATONIC, a. *plă-tŏn'ĭk*, or Platon'ical, a. *-ĭ-kăl* [after *Plato*, a famous anc. Greek philosopher]: pertaining to Plato or to his philosophy: pure; spiritual. Platon'ically, ad. *-lĭ*. Platonize, v. *plā'tŏn-īz* or *plăt'-ŏn-īz*, to think with, or reason as, Plato. Pla'tonizing, imp. Pla'tonized, pp. *-īzd*. Pla'tonist, n. *-ĭst*, one who adheres to the philosophy of Plato. Pla'tonism, n.

-ĭzm, doctrines of Plato, the great fountain of ancient ethics, who taught the eternity of God and matter, the love of truth, wisdom, and beauty, that the supreme and eternal mind contains them all, and that virtue is the harmony of the whole soul (see PLATO; also NEO-PLATONISM). PLATONIC BODIES, the five regular geometrical solids, described first by Plato—viz., the tetrahedron, hexahedron, octahedron, dodecahedron, and icosahedron. PLATONIC LOVE, pure spiritual love subsisting between two persons of different sex, which is presumed to be unaccompanied by any sensuous emotions, and to be based on moral or intellectual affinities; Plato having taught that the common sexual love of the race, harassed and afflicted with fleshly longings, is only a subordinate form of that perfect and ideal love of truth which the soul should cultivate. PLATONIC YEAR, the complete revolution of the equinoxes in about 26,000 years.

PLA'TONISTS, NEW. See NEO-PLATONISM.

PLATOON, n. *plă-tôn'* [F. *peloton*, a clew or little ball of thread—from *pelote*, a ball: Sp. *peloton*, a crowd of persons, a body of soldiers—from L. *pĭla*, a ball]: *formerly*, a small body of soldiers who fired together, drawn from a battalion to strengthen the angles of a square; *now*, two files forming a sub-division of a company. What was called 'platoon exercise,' now 'firing exercise,' is the course of motions in connection with handling, loading and firing the musket or rifle.

PLATT, JOHNSON TOUSEY: jurist: 1845, Jan. 12—1890, Jan. 23; b. Newtown, Conn. He graduated from the Harvard Law School 1865, and practiced law in Pittsfield, Mass., New York, and New Haven. On the reorganization of the Yale Law School 1869, he became professor in that school; later was corporation counsel of New Haven, and did much valuable legal work for the city. He was U. S. commissioner 12 years to 1884; he was also master of chancery of the district of Connecticut.

PLATT, JONAS: 1769, June 30—1834, Feb. 22; b. Poughkeepsie, N. Y.; son of Zephaniah Platt. He studied law with Richard Varick; settled as a lawyer in Whitesboro, near Utica; was gen. of cavalry in state militia; member of congress 1799–1800; four years in state senate from 1809; made the first motion in the senate for construction of the Erie canal, seconded by De Witt Clinton, 1810. He was made judge of the supreme court 1814, and member of the convention that framed the state constitution 1821. He died on his farm near Plattsburg, N. Y.

PLATT, ORVILLE HITCHCOCK: b. Washington, Conn., 1827, July 19; d. there 1905, April 21. He received an academic education, studied law, and began practice 1849. He was clerk of the Connecticut state senate 1855–6; secretary of state of Connecticut 1857; was in

the state senate 1861–2, and in the state house of representatives 1864 and 69. Elected to the U. S. senate as a republican, he took his seat 1879, Mar. 18; he was re-elected 1885, 1891, 1897 and 1903.

PLATT, THOMAS COLLIER: politician: b. Owego, N. Y., 1833, July 15. His health failed while he was at Yale College, and he left in his Sophomore year and engaged in business. He became president of a bank in Tioga, N. Y.; was interested in the lumber business in Michigan; member of the lower house of congress as a republican 1873–77, and of the senate for a few weeks 1881, resigning with Mr. Conkling because of disagreement as to control of federal official appointments in New York; and was defeated for re-election. He was a quarantine commissioner of the port of New York 1880–88, was removed in the latter year, and his appeal to the courts for reinstatement was denied. In 1890, Sept., he was appointed one of the commissioners to select a site for a dry-dock on the Pacific coast north of California. For some years he was president of a railroad, and since 1880 has been president of the United States Express Company. Later, he became leader of the republican party in New York and was a member of the U. S. Senate 1897–1909.

PLATT, ZEPHANIAH: 1735, May 27—1807, Sep. 12; b. Huntington (L. I.), N. Y. He purchased a farm at Poughkeepsie about 1770, soon became prominent in Dutchess Co., was a member of the continental congress, and a sterling patriot. He was chosen to the N. Y. convention of 1776 for framing a constitution for the state; 1777 he was one of the committee of safety for Dutchess Co.; 1778 he was elected a state senator. His vote helped to make the small majority by which N. Y. ratified the constitution of the United States. He was made first judge of Dutchess Co., serving till 1795. The founding of Plattsburg was his closing work; and there he died.

PLATTDEUTSCH, *plât-doytsh* (*Niederdeutsch*), or LOW GERMAN: language of the lowlands of n. Germany, spoken n. of a line passing through Aachen, Bonn, Cassel, Dessau, Wittenberg, and the n. limits of Polish and Lithuanian. It belongs to the same group as the Dutch of the Netherlands (q.v.), Flemish (q.v.), and Frisian (q.v.); and is at the same level of consonantal change as English and Gothic (see GRIMM'S LAW; GERMANY). Its most ancient monument is the *Hêliand* (see SAXONS); till the Reformation, it was the literary language within the limits above named (see REYNARD THE FOX: OWLGLASS), the oldest German translation of the Bible being Low German (see BIBLE). Since then it has been little cultivated, till the times of Klaus, Groth, and Fritz Reuter (q.v.), the chief modern writers in this tongue. It has various local dialects, as Mecklenburgish, East-Frisian, etc.

PLATTE, *plăt* (or NEBRASKA), RIVER: largest river in the state of Neb.; formed by the union, in Lincoln County, of the North Platte, which rises in the North Park of Colorado, and the South Platte, which has its source in the South Park of that state. It passes about 900 m. e. through the central part of the state to Plattsmouth, at which point it empties into the Missouri. It is a very wide but shallow stream, and of little use for navigation. Its chief tributaries are the Loup Fork and the Elkhorn. It drains about 7,500 sq. m., and the valley through which it passes is noted for fertility.

PLAT'TEN-SEE. See BALATON.

PLATTSBURG, *plăts'bèrg:* N. Y., village, port of entry, county-seat of Clinton County; on Lake Champlain, at the mouth of the Saranac River, and on the Delaware & H. and the Chateaugay R.R.'s. It has steamer connection with Burlington, Vt., and all the lake ports. It is about 160 miles north of Albany. It was settled in 1784 by a colony from Long Island and Poughkeepsie in charge of Zephaniah Platt, in whose honor the place was named. It was incorporated as a town the next year. It was the scene or near the scene of some of the important engagements of the Revolutionary War and the War of 1812. The first naval battle between American and British forces took place 1776, Oct. 11, off Valcour Island, a short distance from Plattsburg. Benedict Arnold was in command of the American forces and Sir Guy Carleton of the British. This battle was won by the British. Plattsburg was headquarters for the American forces on the northeastern frontier, in the War of 1812. On 1814, Sept. 11, another engagement took place on Cumberland Bay, an inlet of Lake Champlain (q.v.), while at the same time the British made a land attack. Commodore McDonough (q.v.), commander of the American forces, won the naval victory, and Gen. Macomb was equally successful in defeating the British forces on land. The steady growth of the village was checked by fire on two occasions, in 1849 and 1867, when many of the business houses were destroyed.

Adjoining the village on the south is a U. S. military reservation of 679 acres. In 1838 a U. S. military post was established here, and barracks erected sufficient to accommodate a regiment of infantry. South of the 'Plattsburg Barracks' and on Lake Champlain is Cliff Haven, the home of the Catholic Summer School of America. Plattsburg and the region around are favorite summer resorts. The lake on the east and the Adirondacks on the west furnish a variety of beautiful scenery and greatly modify the temperature during the summer months. It is the commercial and industrial center for nearly all of Clinton County. The chief manufacturing establishments are lumber mills, sewing-machine works, foundries, machine shops, flour mills, woolen goods factory, and wood pulp mills. It has the Vilas

Home for Aged Women, a government building, courthouse, several fine church and school buildings. It is the seat of the Plattsburg State Normal and Training School and of D'Youville Academy. It has a high school, public elementary schools, a village public library and four other libraries. Pop. village (1900) 8,434; town (1900) 11,612; (1910) 11,138.

PLATTS'MOUTH, *plăts'mŭth*: Neb., city, county-seat of Cass County; on the Missouri River, at the mouth of the Platte River, and on the Chicago, B. & Q. and the Missouri P. R. R.'s; about 50 miles northeast of Lincoln, the capital of the state. It is in a productive agricultural section, and has considerable manufacturing interests. The chief industrial establishments are the C. B. & Q. railroad shops, clay product works, cigar factories, and machine shops. The export trade is chiefly in grain, vegetables, and live-stock. The public school system is excellent, consisting of a high school which cost $25,000, supplemented by several graded public schools; there are numerous church edifices; a courthouse erected at a cost of $80,000; and a large opera-house. There are three banks—one national and two state—with a combined capital of $150,000. The city is lighted by gas and electric light; has improved waterworks and a sewerage system. There are three daily and three weekly papers published. The government is vested in a mayor, who holds office two years, and a council. Pop. 5,200.

PLATY-, *plăt'ĭ-* [Gr. *plătus*, flat]: a prefix signifying 'flat or broad.'

PLATYCEPHALIC, a. *plăt'ĭ-sē-făl'ĭk*, or PLAT'YCEPH'ALOUS, a. *-sĕf'ă-lŭs* [Gr. *plătus*, broad; *kephălē*, the head]: broad-headed, as the flat-skulled tribes of the human family.

PLATYCRINITE, n. *plă-tĭk'rĭn-īt*, or PLATYC'RINUS, n. *-rĭn-ŭs* [Gr. *plătus*, broad; *krinon*, a lily]: in *geol.*, a genus of encrinites peculiar to the carboniferous limestones—so termed from the flatness and breadth of the basal and radial plates of the receptacle.

PLATYELMIA, n. plu. *plăt'ĭ-ĕl'mĭ-ă* [Gr. *plătus*, broad; *helmins*, an intestinal worm—from *helissō*, I roll or wind round]: the division of the Scolecida comprising the tapeworms.

PLATYLOBEÆ, n. plu. *plăt'ĭ-lō'bē-ē* [Gr. *plătus*, broad; *lobos*, a lobe]: in *bot.*, a general name for the tribes *Pleu'rorhi'zĕœ* and *Notori'zĕœ*, meaning that the cotyledons are plane or flat. PLATYPHYLLOUS, a. *plăt-ĭ'fĭl-ŭs* [Gr. *phullon*, a leaf]: in *bot.*, broad-leaved.

PLATYPUS, n. *plăt'ĭ-pŭs* [Gr. *plătus*, broad or flat; *pous*, a foot]: Australian quadruped having flat, webbed feet, and a bill like a duck; called also *ornithorhynchus*: see DUCK-BILL.

PLATYRHINA, n. plu. *plăt'ĭ-rī'nă* [Gr. *plătus*, broad;

rhinĕs, nostrils]: a group of the Quadrumana. PLATYRHINE, a. *plăt'ĭ-rīn*, broad-nosed; applied to the new-world monkeys which have their nostrils separated from each other by a broad septum.

PLATYSMA, n. *plă-tĭs'mă* [Gr. *platusmos*, widening, enlargement—from *plătus*, wide]: in *anat.*, a broad, thin, muscular expansion lying under the skin at each side of the neck.

PLATYSOMES, n. plu. *plăt'ĭ-sōmz* [Gr. *plătus*, broad; *sōma*, the body]: a family of coleopterous insects, comprehending species with a wide and much-depressed body.

PLATYSOMUS, a. *plă-tĭs'-ō-mŭs* [Gr. *plătus*, broad; *sōma*,, the body]: broad-bodied—applied to a fossil ganoid fish, from its deep bream-like body.

PLATYSTOMA, *pla-tĭs'to-ma* [Gr. broad-mouth]: genus of fishes of family *Siluridæ*, having a very flat (depressed) snout, and a very large mouth with six long barbels; the skin quite destitute of scales; two dorsal fins; the eyes lateral, level with the nostrils. The species are numerous, some attaining large size, many notable for distinct and conspicuous markings. Several are natives of rivers of n.e. S. America; among these are some of the most beautiful and delicious fresh-water fishes, e.g., *P. tigrinum*, known among different tribes of Indians by various names—*Corutto*, *Colite*, *Oronni*, etc.—which has an elongated body, light blue, transversely streaked with black and white, and a spreading forked tail. It is both taken by baited hooks and shot with arrows by Indians, as are several other species, some of which are found as far s. as Buenos Ayres.

PLAUDIT, n. *plaw'dĭt* [L. *plaud'ĭt*, clap hands—the word which ended anc. L. dramas, and was addressed to the audience—from *plaudo*, I clap the hands in token of approbation]: praise bestowed; applause—usually in the plu. PLAU'DITS, *-dĭts*. PLAU'DITORY, a. *-dĭ-tẽr-ĭ*, applauding; commending.—SYN. of 'plaudit': shouting; applause; acclamation; commendation; approbation; encomium; praise.

PLAUEN, *plow'ĕn:* important manufacturing town of Saxony, in a beautiful valley on the White Elster, 74 m. s. of Leipsic by railway. It was the chief town of the Saxon Voigtland, and its castle was formerly the residence of the Voigt, or imperial commissioner, but is now used as the seat of justice and other courts. Plauen contains a gymnasium, a royal palace, and numerous educational and benevolent institutions. It has extensive manufactures of muslin, cambric, and jaconet goods, and embroidered fabrics and cotton goods, 1884, Sept. 150 buildings were destroyed by fire, and afterward the town was almost wholly rebuilt. Pop. (1900) 73,888.

PLAUSIBLE, a. *plawz'ĭ-bl* [F. *plausible*—from L. *plausib'ĭlĭs*, deserving of applause—from *plaudere*, to

clap the hands in token of approbation: It. *plausibile*]: apparently right; specious; superficially pleasing or taking: popular. PLAUS'IBLY, ad. *-ĭ-blĭ*, with fair show. PLAUS'IBLENESS, n. *-bl-nĕs*, or PLAUS'IBIL'ITY, n. *-bĭl'ĭ-tĭ*, the state of being plausible; speciousness. PLAUSIVE, a. *plawz'ĭv*, in *OE.*, applauding; plausible.—SYN. of 'plausible': ostensible; colorable; specious; superficial.

PLAUTUS, *plaw'tŭs* (T. MACCIUS PLAUTUS): the greatest comic poet of Rome; about B.C. 254–184; b. Sarsina, village in Umbria. We have little knowledge of his early life and education; but it is probable that in youth he came to Rome and there acquired mastery of the Latin language in its most idiomatic form as well as familiarity with Greek literature. It is uncertain whether he ever obtained the Roman franchise. His first employment was with the actors, in whose service he saved money enough to enable him to leave Rome and commence business on his own account. Wherever or whatever this business was, he failed in it, and returned to Rome, where he earned his livelihood in the service of a baker. At this time—a few years before the outbreak of the second Punic war—he was probably about thirty years of age; and while employed in his humble occupation, he composed some plays, which he sold to the managers of the public games, and whose proceeds enabled him to turn to more congenial work. The commencement of his literary carcer may, therefore, be fixed about B.C. 224, from which date he continued to produce comedies with wonderful fertility, till he died in his 70th year. He was contemporary at first with Livius Andronicus and Nævius; subsequently with Ennius and Cæcilius.

Of his numerous plays—130 of which bore his name in the last century of the republic—only 20 have come down to us. Many of them, however, were regarded as spurious by the Roman critics, among whom Varro, in his treatise (*Quæstiones Pautinæ*), limits the undoubtedly genuine comedies of the poet to 21, while he names 19 more as probably genuine. With the exception of the 21st, which was lost in the Middle Ages, these 21 Varronian comedies are the same as those which we now possess. Their titles, arranged (except the Bacchides) in alphabetical order, are as follows: 1, *Amphitryo;* 2, *Asinaria;* 3, *Aulularia;* 4, *Captivi;* 5, *Curculio;* 6, *Casina;* 7, *Cistellaria;* 8, *Epidicus;* 9, *Bacchides;* 10, *Mostellaria;* 11, *Menœchmi;* 12, *Miles Gloriosus;* 13, *Mercator;* 14, *Pseudolus;* 15, *Pœnulus;* 16, *Persa;* 17, *Rudens;* 18, *Stichus;* 19, *Trinummus;* 20, *Truculentus;* 21, *Vidularia.* As a comic writer, Plautus had immense popularity among the Romans, and held possession of the stage till the time of Diocletian. The vivacity, the humor, and the rapid action of his plays, as well as his skill in constructing plots, commanded the admiration of the educated no less than of the unlettered; while the

fact that he was a national poet prepossessed his audiences in his favor. Although he laid the Greek comic drama under heavy contributions, and 'adapted' the plots of Menander, Diphilus and Philemon with all the license of a modern playwright, he always preserved the style and character native to the Romans, and reproduced the life and intellectual tone of the people in a way that at once conciliated their sympathies. The admiration in which he was held by his contemporaries descended to Cicero and St. Jerome; while he has found imitators in Shakespeare, whose *Comedy of Errors* is based on the *Menœchmi;* Molière, Dryden, Addison, and Lessing, and translators in most European countries. Lessing considered the *Captive* the best constructed drama ever put upon the stage. The only complete verse translation of his works into English is by Thornton, Warner and Coleman (5 vols. 1767–74). There is a prose translation in the Bohn library. Unfortunately the text of his plays, as they have come down to us is so very corrupt, so defective from lacunæ, and so filled with interpolations, that much remains to be done by the grammarian and the commentator before they can be read with full appreciation or comfort. The *editio princeps* was printed at Venice, 1742, but more was done in the 19th century, especially the latter half, toward establishing a correct Plautine text than in all the previous centuries. The discovery of the famous Ambrosian palimpsest by Cardinal Mai (1815) and the publication in 1889 of Studemund's apograph of the same led to a great revival of Plautine studies. The epoch-making edition by Ritschl (1848–1854) has been followed by those of Löwe, Götz and Schöll (1871–1894), Ussing (1875–1886), Leo (1895–6) and Lindsay (1903), while there are many excellent editions of single plays.

PLAY, n. *plā* [AS. *plega,* a game, sport, or skirmish; *plegan,* or *plegian,* to play—the idea in play is the exercise of the natural activity of the creature for the mere pleasure of the exertion: prov. F. *plag,* or *play,* litigation, dispute: Sp. *pleito,* debate, strife: OF. *plaidier,* to litigate, to contest: Dut. *pladeren,* to contend: all connected with mid. L. *placitum*]: occupation or exercise of any kind to afford pleasure or diversion, as distinct from work; the exertion of powers of any kind as the *play* of the lungs or muscles; sport; recreation; contest, as in a game; gambling; jest; swing; freedom of action to and fro; in machinery, the freedom of movement within definite limits, allowed in bearing or working parts to prevent their jamming by heating, or by oscillation;; practice; action; scope; a dramatic composition, or the representation of it at a theater; an exhibition or display, as of colors flitting or changing: V. to put into action, motion, or operation; to move irregularly; to perform on, as a musical instrument; to act; to exhibit or represent, as a piece in a theater; to use some exercise

for amusement or recreation; to toy or trifle; to give a fanciful turn to, as to a word; to make sport with or upon; to mock; to practice deception upon; to personate in a drama; to gamble. PLAY'ING, imp. PLAYED, pp. *plād.* PLAYER, n. *plā'ėr,* one who plays; an actor; a musician. PLAYFUL, a. *plā'fûl,* full of play; sportive. PLAY'FULLY, ad. *-lĭ.* PLAY'FULNESS, n. *-nĕs,* the state of being playful. PLAY'SOME, a. *sŭm,* full of frolic and fun; wanton. PLAY-ACTOR, one who performs a part in a drama or play; a professional actor in a theater. PLAY-BILL, a printed sheet narrating the performances at a theatre, and the parts, with the names of the actors who are to play them. PLAY-BOOK, a book of dramatic compositions. PLAY-DAY, a holiday. PLAYFELLOW, a companion in the sports of childhood or youth. PLAY-GOER, a frequenter of theatres. PLAY-GOING, that frequents theatres. PLAY-HOUSE, a theatre. PLAYMATE, a companion in the sports of childhood or youth. PLAYTHING, a toy; anything that serves to amuse. PLAYWRIGHT, a writer of plays, in contempt; an adapter of plays. PLAYING-CARDS, cards with painted figures and devices for playing games: see CARDS. PLAY OF COLORS, appearance of a variety of colors on a body in rapid succession, as on turning a diamond. TO PLAY OFF, to display; to put into exercise; to pit one person against another to make them answer some desired end. TO PLAY ON or UPON, to deceive; to trifle with; to make sport of. TO HOLD IN PLAY, to keep occupied till some wished-for object is attained. PLAY THE DEUCE [see DEUCE 2]: to damage and injure anything.—SYN. of 'play, v.'; to sport; frolic; toy; trifle; mock; operate; act; personate; represent; perform; amuse one's self; gamble.

PLAY. Various phenomena connected with the play of man and of animals have recently attracted the attention of both biologists and psychologists. These two lines of inquiry may be summed up in the two questions: (1) What is the function of play in the life of the organism? and (2) what are the essential psychological characteristics of play as distinguished from those of ordinary mental life?

In answer to the first question, three theories have been advanced, each of which seems to contain an element of truth. (1) There is the 'surplus-energy' theory of Spencer, according to which play is the natural outlet of the surplus energy that has accumulated in a vigorous organism. (2) The 'practice' theory worked out most fully by Groos, according to which play has a positive function in the life of the animal as affording practice and preparation for the serious activities of life. (3) The 'recuperative' theory that regards the play-activities as fulfilling their proper function in affording an opportunity for rest or recuperation on the part of the other activities.

From the psychological side it has sometimes been

held that 'shamming' or semblance (often resulting in real self-illusion) is an essential of all play; but this mark does not seem to be present in all cases. The real differentia of play is perhaps found in the fact that the end of play is always the pleasure of the activity itself, while work has always some end beyond the activity. Consult: Spencer, *Principles of Psychology;* Groos, *The Play of Man,* and *The Play of Animals.*

PLAYFAIR, *plā'fär,* JOHN: Scottish mathematician and natural philosopher: 1748, Mar. 10—1819, July 19; b. Benvie in Forfarshire. His father, minister of the united parishes of Liff and Benvie, sent him to the Univ. of St. Andrews at the age of 14, to study for the Presb. ministry; and here Playfair obtained such reputation as a scholar, especially in methematics and natural philosophy, that while a student he for some time discharged the duties of the nat. philosophy chair during the illness of the professor. In 1773 he entered the ministry, and succeeded his father in the parish of Liff and Benvie. He still prosecuted his favorite studies; in 1782 he resigned his parochial charge, and 1785 became joint-prof. of mathematics with Adam Ferguson in the Univ. of Edinburgh; but exchanged his chair for that of nat. philosophy 1805. He became a strenuous supporter of the 'Huttonian theory' in geology; and after publishing his *Illustrations of the Huttonian Theory of the Earth* (Edin. 1802), he made many scientific journeys. He died at Edinburgh. Playfair, according to Jeffrey (*Annual Biography* 1820), 'possessed in the highest degree all the characteristics both of a fine and a powerful understanding.' Playfair in his later years of life was sec. to the Royal Soc. of Edinburgh. From 1804 he was a frequent contributor to the *Edinburgh Review* of articles of scientific criticism. He wrote the articles 'Æpinus' and 'Physical Astronomy,' and an incomplete 'Dissertation on the Progress of Mathematical and Physical Science,' for the *Encyclopœdia Britannica.* His contributions to the *Transactions of the Royal Soc. of Edinburgh* are numerous and exceedingly varied, a treatise on 'Naval Tactics' even appearing among them. His separate works are: *Elements of Geometry* (Edin. 1795); *Outlines of Nat. Philosophy* (Edin 1812 and 16), being the heads of his lectures in the univ. on that subject.

PLAYFAIR, *plā'fär,* LYON, Baron, P., LH.D., F. R. S.; b. Bengal, 1818, May 21; d. London, 1898, May 29; son of George Playfair. After studying at St. Andrews, Scotland, he took special courses in chemistry, of which science he became professor in the Royal Institution at Manchester 1843. He held various government positions, became professor in the Univ. of Edinburgh 1858, and ten years later entered parliament; was postmaster-gen. 1873–4, president of the commission which reorganized the civil service 1874, and held other important offices. He gave special attention to sanitary and social

science, and published several scientific books and papers. He was raised to the peerage 1892.

PLAY OF COLORS: in mineralogy, is the rapid display of different colors on revolving a mineral. It is this property which adds so much to the beauty of the diamond (q.v.) and other gems. The play of colors in many gems is due to their high refractive and dispersive power. The magnificent play of colors of the precious opal was attributed by Brewster to microscopic cavities, but Behrends has proved that it is due to thin, curved lamellæ of the mineral, the refractive power of which may vary by 0.1 from that of the mass. These lamellæ are assumed to have been originally in parallel position, but they were bent and broken in the solidification of the mineral.

PLAZA, n. *plâ-zà* [Sp. fr. L. *platea* (see PLACE)]: open place for traffic or pleasure, especially in a Spanish or S. American town.

PLEA, n. *plē* [F. *plaid;* It. *piato;* Sp. *pleito; OF. plait*, a suit at law—from mid. L. *placĭtum*, a plea—from *placēre*, to please]: in a *court of law*, the answer given by the defendant or defender to the declaration and demand of the plaintiff or pursuer; a suit at law; a criminal process (see below): an excuse or apology; something alleged in defense or justification. PLEAD, v. *plēd* [F. *plaider*, to sue, to go to law]: to argue or reason in support of a claim; to offer in excuse; to vindicate; to supplicate; to argue before a court of justice; to admit or deny a charge of guilt, as in a trial. PLEAD'ING, imp.: ADJ. imploring: N. act of a pleader, who supports by arguments; argument in a suit. PLEAD'ED, pp. offered or urged to defense; alleged in proof. PLEAD'ER, n. *-ẽr*, one who pleads or argues in a court of justice; one who speaks for or against. SPECIAL PLEADER, one who devotes himself to the drawing up of common law pleadings and the like, which enable the court and the jury to discover at one view the number and the nature of the precise points in dispute. PLEAD'INGLY, ad. *-lĭ*. PLEAD'INGS, n. *-ĭngz*, the mutual allegation in writing between a plaintiff and a defendant in a court of law before the trial. PLEAD'ABLE, a. *-ă-bl*, that may be alleged in plea.

PLEACH, v. *plēch* [OF. *plesser* (see PLASH 2)]: in *OE.*, to bend; to interweave, as twigs. PLEACH'ING, imp. PLEACHED, pp. *-plēcht:* ADJ. entwined; fastened.

PLEA—PLEADING, in Law: in a general sense, the conducting of suits; specifically, the response of a defendant to the allegations of a plaintiff. A plea is a statement of facts. It is *dilatory* when founded on facts not essential to the action, as when the court's want of jurisdiction is alleged, or the defendant's temporary inability to proceed, or when some matter is alleged as ground for abating or quashing the complaint. A plea is *peremptory*, or a 'plea in bar,' when it denies the whole, or the

essential parts of the complaint: a plea in bar may allege justification or excuse of the act complained of, satisfaction of an obligation, payment of a debt, etc. A plea *in confession and avoidance* admits the truth of the plaintiff's contention, but sets up other facts which annul its legal effect. Technically, *demurrer* is not a plea; but it is an 'answer to a complaint' and therefore is in effect the same thing as a plea. See DEMURRER.

PLEASANTNESS and UNPLEASANTNESS. These terms are used technically in psychology to denote the agreeable and disagreeable 'feeling-tones' of certain sensations and combinations of sensations. Unpleasantness is more inclusive than 'pain,' because the latter word is now used in psychology to denote a special sensation.

PLEASE, v. *plēz* [F. *plaisir*, pleasure; *plaisant*, pleasing; *plaire*, to please—from L. *placēre*, to please]: to delight or gratify; to excite agreeable sensations in; to satisfy; to give pleasure; to gain satisfaction; to condescend; to comply; to like; to choose. PLEAS'ING, imp.: ADJ. giving pleasure; agreeable; gratifying; gaining approbation; acceptable. PLEASED, pp. *plēzd*. PLEAS'EDNESS, n. *-ĕd-nĕs*, the state of being pleased. PLEAS'ER, n. *-ẽr*, one who pleases; one who tries to please; one who courts favor. PLEAS'INGLY, ad. *-lĭ*, in a manner to give delight. PLEAS'INGNESS, n. *-nĕs*, the quality of giving pleasure. PLEASANCE, n. *plĕz'ăns* [F. *plaisance*]: in *OE.* pleasantry; gayety; merriment. TO BE PLEASED WITH, to approve; to like. PLEASANT, a. *plĕz'ănt*, grateful to the mind or senses; delightful; cheerful; agreeable; in *OE.*, trifling, ludicrous. PLEAS'ANTLY, ad. *-lĭ*, happily; gayly; merrily; in good-humor. PLEAS'ANTNESS, n. -nĕs, the state or quality of being pleasant. PLEAS'ANTRY, n. *-rĭ*, gayety; merriment; humor; lively talk. PLEASURE, n. *plĕzh'ûr*, agreeable sensations or emotions; enjoyment or gratification of the mind or senses; what the will dictates or prefers; preference; delight; choice; purpose; arbitrary will; that which pleases: V. in *OE.*, to please; to gratify. PLEAS'URELESS, a. *-lĕs*, devoid of pleasure. PLEAS'URABLE, *a.* *-ă-bl*, delightful; gratifying; pleasing. PLEAS'URABLY, ad. *-blĭ*. PLEAS'URABLENESS, n. *-bl-nĕs*, the quality of being pleasurable. PLEASURE-BOAT, a boat to sail in for amusement. PLEASURE-GROUND, ground adjoining a dwelling-house, laid out in an ornamental manner. PLEASE'MAN, in *OE.*, an officious fellow; a pickthank or flatterer.—SYN. of 'pleasant': agreeable; good-humored; pleasing; delightful, gratifying, grateful; cheerful; amusing; humorous; jocose; gay; enlivening; lively; merry; sportive; witty; facetious; nice; pleasurable; acceptable;—of 'pleasure': enjoyment; comfort; solace; satisfaction; delight; gladness; joy; purpose; command; intention; will; choice; approbation; preference.

PLEASURE: a state of feeling opposed to the disa-

greeable, but apparently so fundamental in experience as not to admit of analysis or description. The common antithesis of pleasure is pain (q.v.), and pain is largely a definite sensation; but, except in case of sexual sensations, it does not seem possible to identify pleasure with a definite sensation, due to the stimulation of a special set of sense organs. As to the cause of pleasure, an ancient view, hardly acceptable now, held it to be merely relief from pain; one modern view makes it the feeling of free, unimpeded activity; another derives it from suitable conditions of the cerebral blood supply; its physiology is not yet well understood.

PLEASANTON, *plĕz'on-ton*, ALFRED: soldier; b. Washington, D. C., 1824, June 7; d. there 1897, Feb. 17. He graduated at the U. S. Milit. Acad. 1844; served in the Mexican war; was commissioned 1st lieut. 1849, capt. 1855, maj. of cavalry 1862. He served through the campaign in the Virginia peninsula, and was commissioned brigadier-general of volunteers 1862, July. He commanded the cavalry division that harassed Lee's rear in the invasion of Maryland, was engaged at Boonsboro, South Mountain and Antietam, and took part in the pursuit of the retreating enemy. By prompt and skilful action at Chancellorsville, he saved Hooker's army from disaster. He participated in all the actions preceding the battle of Gettysburg, and commanded all the Federal cavalry forces on that field. At Antietam he won the brevet of major-general of volunteers, and at Gettysburg that of colonel in the regular army. Transferred to Missouri 1864, he drove the Confederate forces under Gen. Price out of the state. He was brevetted brigadier-general and major-general in the regular army 1865. He retired from the service 1868, and thereafter for several years was collector of internal revenue, and later president of the Cincinnati and Terra Haute railroad. He was placed on the retired list of the army, with the rank of colonel, 1888.

PLEAT, v. *plēt:* another spelling of PLAIT, which see.

PLEBEIAN, a. *plĕ-bē'ăn* [F. *plébéien;* L. *plebeius*, plebeian—from *plebs*, or *plēbem*, the common people of ancient Rome.]: of or relating to the common people; low; vulgar: N. one of the common people. PLEBEI'ANISM, n. *-izm*, the conduct of the common people.—*Plebeians*, in anc. Rome, were the common people; one of the two elements of which the Roman nation consisted. Their origin, as a separate class, is traced partly to natural, partly to artificial causes. The foundation of Rome, probably as a frontier emporium of Latin traffic (according to Mommsen's suggestion), would bring about the place a number of inferior *employés*, clients, or hangers-on of the enterprising commercial agriculturists, who laid the primitive basis of the material and

social prosperity of the city. These hangers-on were the original plebeians, or non-burgesses of Rome, whose numbers were constantly increased by the subjugation of surrounding cities and states. Thus, tradition states that, on the capture of Alba, while the most distinguished citizens of that town were received among the Roman patricians, the greater part of the inhabitants, likewise transferred to Rome, were kept in submission to the *populus* or patricians of Rome—in other words, swelled the ranks of the plebeians. Similar transfers of some of the inhabitants of conquered towns are assigned to the reign of Ancus Martius. The order of plebeians, thus gradually formed, soon exceeded the patricians in numbers, partly inhabiting Rome, and partly the adjoining country. Though citizens, they were not comprehended in the three tribes, nor in the *curiæ*, nor in the patrician *gentes;* and were therefore excluded from the comitia, the senate, and all the civil and priestly offices of the state. They could not intermarry with the patricians.

The first step (according to traditionary belief) toward breaking down the barrier between the two classes was the admission, under Tarquinius Priscus, of some of the more considerable P. families into the three tribes. Servius Tullius divided the part of the city and adjacent country inhabited by plebeians into regions or local tribes, assigning land to those plebeians who were yet without it. The P. tribes, with tribunes at their head, formed an organization similar to that of the patricians. The same king further extended the rights of the plebeians by dividing the whole body of citizens, patrician and plebeian, into five classes, according to their wealth, and forming a great national assembly called the *Comitia Centuriata*, in which the plebeians met the patricians on a footing of equality; but the patricians continued alone eligible to the senate, the highest magistracy, and the priestly offices. These newly acquired privileges were lost in the reign of Tarquinius Superbus, but restored on the establishment of the Republic. Soon afterward the vacancies which had occurred in the senate during the reign of the last king were filled by the most distinguished of the P. equites, and the plebeians acquired a variety of new privileges by the laws of Valerius Publicola. The encroachments on those privileges on the part of the patricians began the long-continued struggle between the two orders, which eventually led to the plebeians gaining access to all the civil and religious offices, acquiring for their decrees (*plebiscita*) the force of law. Under the Hortensian law, B.C. 286, the two hostile classes were at last amalgamated in one general body of Roman citizens with equal rights. Thenceforth the term *populus* is applied sometimes to the plebeians alone, sometimes to the whole body of citizens assembled in the *Comitia Centuriata* or *Tributa;* and *plebs* is occasionally used in a loose way for the multitude or populace, in opposition to the senatorial party. See PATRICIAN

PLEBISCITE, n. *plĕb'ĭ-sĭt* or *-sīt* [F. *plébiscite*—from L. *plebiscītum*, an ordiance or decrec of the people—from L. *plebs*, the common people; *scītum*, a decrec—from *sciscĕre*, to ordain]: a vote taken of the whole male inhabitants of a country or town, who are of age, on any matter submitted to them for their decision; a vote by universal suffrage. The term has been applied in the political phraseology of modern France to a decree of the nation obtained by an appeal to universal suffrage. Thus, Louis Napoleon was chosen president, and subsequently emperor, by a P. The word is borrowed from the Latin; but the *plebiscitum* of the Romans properly meant only a law passed at the *Comitia Tributa*, i.e., assembly of the *plebs*, or 'commons,' as distinguished from the *populus*, or the 'nobles;' and though it was ultimately obligatory on both classes of the community, it, of course, could refer to such matters only as were within the province of the *Comitia Tributa*, and could not fundamentally alter or destroy the constitution.

PLECTOGNATHI, *plĕk-tŏg'na-thī:* in the system of Cuvier, and also in that of Müller, an order of osseous fishes, but having the skeleton less perfectly ossified than osseous fishes generally; the skin furnished with ganoid scales or spines; and characterized particularly by having the maxillary and premaxillary bones anchylosed or soldered together. The gill-lid and rays are concealed under the thick skin, with only a small opening. The ribs are very short, and there are no distinctly developed ventral fins. The fishes belonging to this order are not many. They are regarded as a connecting link between the osseous and the cartilaginous fishes. The P. include the Trunk or Box fishes (*Ostraciontidæ*), mostly tropical, 5 species found on the e. United States coast, one of these also Californian; the File-fishes (*Balistidæ*), chiefly tropical, 4 species as far n. as New England, one of which is named, from its color, the Orange File-fish (*Alutera Schœpfii*), called also Barnacle-eater, these fish having strong teeth to crush shells, and the name file referring to their rough skin; the Porcupine-fishes (*Diodontidæ*), the name especially of the spiny species, but the family including the Puffers, known also as Burr-fish, Ball-fish, Swell-fish, and Toad-fish, of which there are 4 Atlantic and 2 Pacific coast species; the Bellows-fishes (*Tetrodontidæ*), such as the common Swell-fish, or Egg-fish, from Cape Cod to the Gulf, and the Rabbit-fish, a straggler n. from the Gulf; and the Sunfishes (*Orthagoriscidæ*), pelagic, of extraordinary forms, some higher than long, as if all head, and the largest weighing 700-800 lbs. Other families and classifications are made.

PLECTOGNATHIC, a. *plĕk'tŏg-năth'ĭk*, or PLECTOGNATHOUS, a. *plĕk-tŏg'nă-thŭs* [Gr. *plektos*, twisted, knitted—from *plekō*, I twist; *gnathos*, the cheek]: having the cheek-bones immovably united with the jaws; applied to an order of fishes called the PLECTOGNATHES, *plĕk'tŏg-nāths* or *-nā'thēs*, including the trunk-fish, sunfish, etc.

PLECTRUM, n. *plĕk'trŭm* [L. *plectrum;* Gr. *plēktron*, a plectrum—from Gr. *plēttō*, I strike]: a small piece of metal, wood, or ivory, with which the ancients struck the lyre, or other stringed instrument.

PLED, v. *plĕd* [see PLEAD, under PLEA]: another spelling of PLEADED; in *Scotch law*, argued or returned answer, as, 'he *pled* guilty.'

PLEDGE, n. *plĕj* [F. *pleige;* OF. *plege;* Dut. *pleghe*, duty or tribute: It. *pieggieria*, a surety, bail, pledge: L. *pignus*, a security]: anything deposited as security; surety; the deposit of a chattel or movable with a creditor in security of a debt; involving a contract between the parties that the pledgee shall keep the chattel till the debt is paid (see PAWNBROKING): a promise solemnly given; a warrant given, as one's faith or word; a hostage: a drinking to the health of a person: V. to warrant; to deposit as security; to pawn; to engage by promise or declaration; to drink to the health of another. PLEDG'ING, imp. PLEDGED, pp. *plĕjd:* ADJ. deposited as a security; solemnly promised. PLEDG'ER, n. *-ėr*, one who pledges. TO HOLD IN PLEDGE, to keep as security. TO PUT IN PLEDGE, to pawn. TO TAKE THE PLEDGE, to become a total abstainer.—SYN. of 'pledge, n.': deposit; security; earnest; trust; pawn; gage; guarantee; surety; hostage; bail; warrant; promise.

PLEDGET, n. *plĕj'ĕt* [from PLUG]: a small mass of dry lint laid over a wound.

PLEIADS, n. plu. *plī'ădz*, or PLEIADES, n. plu. *plī'ă-dēz* [L. and Gr. *Pleïădes*, the seven daughters of Atlas and Pleïone, said to have been placed by Jupiter among the stars; the sailing stars—probably derived from *pleïn*, to sail, because they rose at the beginning of the sailing season]: cluster of seven stars in the constellation Taurus. —The *Pleiades*, in Greek mythology, were, according to the most general account, the seven daughters of Atlas and of Pleione, daughter of Oceanus. Their history is related differently by the Greek mythologists: according to some, they committed suicide from grief, either at the death of their sisters, the Hyades, or at the fate of their father, Atlas (q.v.); according to others, they were companions of Artemis (Diana), and, being pursued by Orion (q.v.), were rescued from him by the gods by being translated to the sky; all authorities, however, agree that, after their death or translation, they were transformed into stars. Only six of these stars are visible to the naked eye, and the ancients believed that the seventh hid herself from shame that she alone of the P. had married a mortal, while her six sisters were the spouses of different gods. Their names are Electra, Maia, Taygete, Alcyone, Celæno, Sterope (the invisible one), and Merope.

In astronomy, a group or constellation of six stars placed on the shoulder of Taurus, the second sign of the Zodiac, and forming, with the pole-star and the twin Castor and Pollux, the three angular points of a figure which is nearly an equilateral triangle. Many believe, from the uniform agreement that the P. were 'seven' in number, that the

constellation at an early period contained 'seven' stars, but that one has since disappeared—not a very uncommon occurrence.

The name *Poetical Pleiades* is frequently applied to reunions of poets in septenary groups; and this use of the word dates from the time of the Ptolemies—the originator of the first being Ptolemy Philadelphus, who, from the number of the Greek poets that flocked to Alexandria, chose out seven, whom he treated with special distinction, and denominated his *pleiad*. His example was followed by Charlemagne; and the same system was continued by the 'Compagnie des Sept Mantenadors del gay Saber,' or the 'Compagnie des Sept Troubadours de Toulouse,' till the 17th c. Such associations were valuable as promoting interchange of ideas and opinions by those eminent in the same department of letters, and creating a kind of *esprit du corps* among them.

PLEI'OCENE: see PLIOCENE.

PLEIOMAZIA, n. *plī'ō-mā'zhĭ-ă* [Gr. *pleiōn*, more; *mazŏs*, the breast]: an excess in the number of mammæ, rarely observed in men, more commonly in women.

PLEIOMORPHY, n. *plī'ō-mŏr'fĭ* [Gr. *pleiōn*, more; *morphē*, shape]: in *bot.*, the renewed growths in arrested parts of irregular flowers.

PLEIOPHYLLOUS, a. *plī-ŏf'ĭl-lŭs* [Gr. *pleiōn*, more; *phullon*, a leaf]: in *bot.*, applied to plants whose stems have no buds, and consequently no branches developed in the axils of the leaves. PLEIOPHYLLY, n. *plī-ŏf'ĭl-lĭ*, the condition of a plant in which there is an absolute increase in the number of leaves starting from one particular point, or in which the number of leaflets in a compound leaf is preternaturally increased.

PLEIOSAURUS: see PLIOSAURUS.

PLEIOTAXY, n. *plī'ō-tăks'ĭ* [Gr. *pleiōn*, more; *taxis*, arrangement—from *tassō*, I put in order]: in *bot.*, an increase in the number of whorls.

PLEIOTRACHEÆ, n. plu. *plī'ō-trā-kē'ē* [Gr. *pleiōn*, more; *tracheïă*, the windpipe]: in *bot.*, numerous fibres united together, as in the banana, and assuming the aspect of a broad ribbon; spiral vessels with several fibres united.

PLEISTOCENE, n. *plīs'tō-sēn* [Gr. *pleistos*, most; *kainos*, recent], or NEWER PLIOCENE: terms introduced by Sir Charles Lyell to designate the most recent Tertiary deposits, whose organic remains belong almost exclusively to existing species. The terms, so far as now used, are applied to the Glacial or lower Quaternary or Post-tertiary. See GLACIAL PERIOD: QUATERNARY.

PLENARY, a. *plē'nă-rĭ* [mid. L. *plenarius*, entire; L. *plēnus*, full: It. *plenario*, plenary]: full; entire; complete. PLE'NARILY, ad. *-lĭ*. PLE'NARINESS, n. *-nĕs*, the state of being plenary. PLENARTY, n. *plē'nâr-tĭ*, the state of a benefice or an office when full or occupied.

PLENIPOTENT, a. *plĕn-ĭp'ō-tĕnt* [L. *plēnus*, full; *potens* or *poten'tem*, powerful: Sp. *plenipotencia*, plenipotence]: possessing full power. PLENIP'OTENCE, n. *-tĕns*, the possession of full power. PLENIPOTENTIARY, a. *plĕn'-ĭ-pō-tĕn'shăr-ĭ* [F. *plénipotentiaire*, an ambassador]: having or containing full power: N. a person, particularly an ambassador, who is invested with full powers to negotiate a particular business or treaty; a resident minister at a foreign court. See ENVOY; AMBASSADOR; EMBASSY; MINISTER (in Doplomacy).

PLENISH, v. *plĕn'ĭsh* [L. *plēnus*, full] in *O.E.*, to replenish; in *Scot.* (rare), to furnish a house; to stock a farm. PLEN'ISHING, n. household furniture; the stocking of a farm.

PLENTITUDE, n. *plĕn'i-tūd* [F. *plénitude*—from L. *plenĭtūdĭnem*, fulness, completeness—from *plēnus*, full; It. *plenitudine*]: fulness; abundance; exuberance; repletion.

PLENTY, n. *plĕn'tĭ* [OF. *plentet*, *plenté*—from L. *plenĭtas*, fulness, saturation—from *plēnus*, full: abundance; copiousness; an adequate or full supply; state in which enough is enjoyed. PLENTEOUS, a. *plĕn'tĭ-ŭs* [OF. *plentivose*]: fully sufficient for every purpose; copious; abundant. PLEN'TEOUSLY, ad. *-lĭ*, abundantly; exuberantly. PLEN'TEOUSNESS, n. *-nes*, the state of being abundant. PLENTIFUL, a. *plĕn'tĭ-fûl*, copious; yielding abundance; fruitful. PLEN'TIFULLY, ad. *-lĭ*. PLEN'TIFULNESS, n. -nĕs, the state or quality of being plentiful; abundance. —SYN. of 'plenteous': copious; exuberant; abundant; plentiful; fruitful; fertile; ample; full.

PLENUM, *plē'nŭm* [Lat. *plenus*, full]: a term applied to the conception of space as occupied in all of its portions to the exclusion of any complete vacuum or empty space.

PLENUS, a. *plē'nŭs* [L. *plēnus*, full]: in *bot.*, double, applied to stamens and pistils which become petaloid; having a solid stem.

PLEOCHROISM, n. *plē-ŏk'rō-ĭzm* [Gr. *pleiōn*, more; *chrōs*, color of the skin]: the property of displaying different colors, when viewed in different directions or by transmitted light, as in certain minerals.

PLEONASM, n. *plē'ō-năzm* [Gr. *pleonas'mos*, superabundance—from *plĕŏs*, full]: an overfulness of words in speaking or writing; redundance of expression. PLEONASTIC, a. *plē'ō-năs'tĭk*, or PLE'ONAS'TICAL, a. *-tĭ-kăl*, pertaining to pleonasm; redundant. PLE'ONAS'TICALLY, ad. *-lĭ*.

PLEONASTE, n. *plē'ō-năst* [Gr. *plĕonas'tos*, abundant]: a dark or pearly-black variety of spinel, containing iron; a stone of considerable brilliancy when cut and polished.

PLEOSPORA, n. *plē-ŏs'pō-ră* [Gr. *plĕŏs*, full; *spora*, a spore, seed]: another name for 'Cladosporium herbarum,' a disease in silk-worms, caused by a fungus.

PLEROMA, n. *plē-rō′ma* [Gr. *plērōma*, that which fills, complement]: in *anc. gnosticism*, the boundless space, considered as the spiritual world, through which God, viewed as the purest light, is diffused, and in which are the æons. —In *scrip.*, P. means fulness; specially the plenitude of the Divine perfections.

PLEROME, n. *plē-rō′mĕ* [Gr. *plērōma*, fulness, complement—from *plērēs*, full]: the state of being filled up or completed; in *bot.*, the central portion of the primary meristem, immediately inclosed by the periblem, and giving rise to the fibro-vascular bundles.

PLESH, n. *plĕsh:* OE. for Plash, a puddle.

PLESIOMORPHOUS, a. *plē′zĭ-ō-mŏr′fŭs* [Gr. *plēsiŏs*, near to; *morphē*, form]: applied to crystallized substances whose forms closely resemble each other, but are not absolutely alike. Ple′siomor′phism, n. *-mŏr′fĭsm*, nearness of form.

PLESIOSAURUS, n. *plē′zĭ-ō-saw′rŭs* [Gr. *plēsiŏs*, near to; *sauros*, a lizard]: remarkable genus of fossil sea-reptiles, the species of which are found in the Lias, Oolite, and Cretaceous measures. Its remains are so abundant and so perfectly preserved, that we are as well acquainted with skeletons of many of its species as with those of any living animals. These represent a strange animal, the structure of which Cuvier considered the most singular, and its character the most anomalous, that had been discovered amid the ruins of former worlds. In the words of Buckland: 'To the head of a lizard, it united the teeth of a crocodile, a neck of enormous length, resembling the body of a serpent, a trunk and tail having the proportions of an ordinary quadruped, the ribs of a chameleon, and the paddles of a whale.' The limbs were covered with integument, so as to form simple undivided paddles, as in the turtle.

The supposed habits of the plesiosaur are thus described by Conybeare: 'That it was an aquatic, is evident from the form of its paddles; that it was marine, is almost equally so, from the remains with which it is universally associated; that it may have occasionally visited the shore, the resemblance of its extremities to those of the turtle may lead us to conjecture; its motion must have, however, been very awkward on land; its long neck must have impeded its progress through the water, presenting a striking contrast to the organization which so admirably fits the ichthyosaur to cut through the waves. May it not, therefore, be concluded—since, in addition to these circumstances, its respiration must have required frequent access to the air—that it swam upon or near the surface, arching back its long neck like the swan, and occasionally darting it down at the fish which happened to float within its reach? It may perhaps have lurked in shoal-water along the coast, concealed among the sea-weed, and, raising its nostrils to the surface from a considerable depth, may have found a secure retreat from the assaults of dangerous enemies; while the length and flexibility of its neck may

have compensated for lack of strength in its jaws, and its incapacity for swift motion through the water, by the suddenness and agility of the attack which they enabled it to make on every animal fitted for its prey which came within its reach.'

The remains of this animal were discovered first at Lyme Regis, England, 1822. Since then 22 species have been described, the specific differences resting chiefly on peculiarities in the form and structure of the vertebræ. Five or more genera closely related to P. are found in the Cretaceous deposits of N. America. A most remarkable form among these was the *Elasmosaurus*, 45 ft. long, with snake-like neck of more than 60 vertebræ.

PLESKOV: see Pskov.

PLESSIS, *plĕs-sē'*, Joseph Octave: 1763–1825, Dec. 4, b. near Montreal, Can.: Rom. Cath. archbishop. He was ordained priest 1786; appointed coadjutor to the bp. of Quebec 1801, whom he succeeded 1806. Being a strenuous maintainer of French-Canadian rights, his accession to the see of Quebec gave much offense to the English party in Lower Canada, and an unsuccessful attempt was made to prevent him from taking the oath of allegiance. Complaint lodged with the home govt. by Gov. Craig, 1810, resulted only in the recall of Craig: the new gov. conceded all P.'s demands. During the war of 1812 P. held his people fast in loyalty to England: his reward was a life-pension and a seat in the legislative council. Quebec became a metropolitan see 1818, and P. abp. Mainly through his exertions two attempts at effacing French-Canadian nationality—legislative union of the provinces, and a uniform system of schooling—were defeated 1822. The education law of 1824 was largely his work.

PLETHON, or Pletho: see Gemistus.

PLETHORA, n. *plĕth'ō-ră* [Gr. *plēthō'rē*, fulness—from *plēthō*, I am or become full]: redundant fulness of the blood-vessels; excess in the amount or quality of food and drink partaken of; a superabundance of anything, as, a plethora of wealth. Plethoric, a. *plē-thŏr'ĭk*, or Plethoretical, a. *plĕth'ō-rĕt'ĭ-kăl*, having excess of blood.—*Plethora* designates a general excess of blood in the physical system. It may arise either from too much blood being made, or from too little being expended. The persons who become plethoric are usually those in thorough health, who eat heartily and digest readily, but who do not take sufficient bodily exercise, and do not duly attend to the action of the excreting organs. With them, the process of blood-making is always on the increase, and the vessels become more and more filled, as is seen in the red face, distended veins, and full pulse. The heart is excited and overworked; hence palpitation, shortness of breath, and probably a drowsy feeling may arise; but these symptoms, instead of acting as a warning, too often cause the abandonment of all exercise, by which the morbid condition is aggravated. The state of P. thus gradually induced may be extreme without any functions materially failing, and

yet the subject is on the verge of some dangerous malady, e.g., apoplexy, or structural disease of the heart or great vessels, or of the lungs, kidneys, or liver.

Plethora is said to be *sthenic* when the strength and irritability of the muscular fibres (especially of the heart and arteries) are fully or excessively developed. This form commonly affects the young and active, and those of sanguineous nature. The blood is rich in red cells and fibrine; and there is a tendency to general febrile excitement, active hemorrhages, fluxes, and inflammation. A natural cure is thus often effected by the supervention of an attack of bleeding from the nostrils or from piles, or of mucous or bilious diarrhea. The plethora is said to be *asthenic* [Gr. *a.*, not; *sthenos*, strength when there is a deficiency of contractility and tone in the muscular fibre. In this case, the heart and vessels, instead of being excited (as in sthenic plethora) by the augmented quantity of blood, are oppressed by its load, and cannot duly expel their accumulated contents. The face is purple instead of red; the extremities cold, and the excreting organs sluggish. This form affects persons weakened by age, excesses, or previous disease. It tends to produce congestions and passive hemorrhages, fluxes, and dropsies; and, if continued, structural changes, as dilatation of the heart, enlarged liver, varicose veins, etc.

In *sthenic* Plethora, blood-letting is the first remedy, and this, with the continued use of aperient medicine and a sparing diet, is often sufficient for cure. If these means fail, recourse must be had to antimonials, salines, digitalis, and sometimes mercury or colchicum. In the *asthenic* form, Dr. Williams (see his article on 'Plethora,' in *Principles of Medicine*, for further details) observes that 'the continued use of alterative aperients and diuretics, such as mild mercurials, with rhubarb, aloes, or senna, salines and taraxacum, nitric acid, iodide of potassium, etc., may prepare the way for various tonics, such as calumba, bark, and iron.' He recommends also the use of certain mineral waters; first the saline, which are aperient and diuretic; afterward the chalybeate, which, though tonic, usually contain enough saline matter to keep the secretions free. Food may be taken more freely than in the sthenic form; and in both varieties, as much exercise in the open air should be taken as can be borne without exhaustion.

PLETHRON, n. *plĕth'ron* [Gr. *plēthron*]: in ancient Greece, a measure of length, being 100 Greek or 101 English ft., the sixth part of the stadium; as a square measure, 10,000 Greek sq. ft.; used also to translate the Roman jugerum, though this was about 28,000 sq. ft.

PLEURA, n. *plô'ră* [Gr. *pleura*, the side, a rib]: a serous membrane or sac covering each lung (*visceral P.*) and also lining the inside of the chest or thorax (*parietal P.*). The Pleura forms two shut sacs, quite distinct

from each other, which line the right and left sides of the thoracic cavity. The Pleura investing the lungs is a very delicate serous membrane, which, after inclosing the whole organ, except at its root, where the great vessels enter it, is reflected upon the inner surface of the thorax or chest. That portion of the pleura in contact with the surface of the lung is called the *pleura pulmonalis*, or visceral layer; while that which lines the interior of the chest is caled the *pleura costalis*, or parietal layer; while the space intervening between these two layers is called the *cavity of the pleura*. Each pleura is a closed sac, quite independent of the other. The interspace between the pleuræ on the right and the left

A transverse section of the Thorax, showing the reflection of the Pleura, and the relative position of the Viscera, etc.
(From Gray's *Anatomy*.)

1, The visceral and, 2, the parietal layer of the pleura, on the right side; 3, 3, the ribs; 4, 5, section of the right and left lungs; 6, the heart; 7, the pulmonary artery, dividing into the right and left branches; 8, 8′, the right and left pulmonary veins; 9, 9′, the ascending and descending aorta, the intervening arch being cut away; 10, 10′, the right and left bronchi; 11, the esophagus; 12, body of dorsal vertebra; 13, the sternum.

side is termed the *mediastinum*, and contains all the viscera of the thorax excepting the lungs. The inner surface of each pleura is smooth, glistening, and moistened by a serous fluid; the outer surface is closely adherent to the surface of the lung, to the roots of the pulmonary vessels as they enter the lung, to the upper surface of the diaphragm, and to the walls of the chest. The lobes of the lungs are separated from one another by involutions or infoldings of the visceral layer; two such involutions—one on either side—are shown in the figure. PLEURAL, a. *-răl*, connected with the pleura. PLEURISY, n. *-rĭ-sĭ*, or PLEURITIS, n. *-rī′tĭs*, the inflammation of the inner membrane of the thorax (see PLEURISY, below). PLEURITIC, a, *plô-rĭt′ĭk*, pert, to or affected with pleurisy. PLEURAL CAVITY, sac of the pleura.

PLEURACANTHUS, n. *plo͝o′ră-kăn′thŭs* [Gr. *pleura*, the side; *akan′tha*, a thorn or spine]: in *geol.*, a genus of fossil fin-spines, having a row of sharp hooks or denticles on each side.

PLEURAPOPHYSIS, n. *plo͝o′ră-pŏf′ĭ-sĭs*, PLEU′RAPOPHYSES, n. plu. *-pŏf′ĭ-sēz* [Gr. *pleura*, the side, a rib; *apophŭsis*, the process of a bone]: a true rib.

PLEURENCHYMA, n. *plo͝o-rĕng′kĭ-mă* [Gr. *pleura*, a side or rib; *eng′chuma*, juice, substance of organs]: in *bot.*, woody tissue, consisting of tough, slender tubes, out of which the woody parts are mainly formed.

PLEURITIS: *Pleurisy.*—Inflammation of the pleura. The disease presents itself in two forms, as dry, or adhesive, pleurisy, and pleurisy with effusion. It is usual, however, to consider it according to the course of the disease, as acute and chronic.

Acute fibrinous or plastic pleurisy.—This is an affection resulting from the effects of exposure to damp cold, in which the membrane acquires a covering of clouded, granular lymph, of varying thickness or becomes coated with layers of fibrin. It commences with pain in the side and slight fever. With the ear applied to the seat of pain friction sounds may be heard, which disappear after a few days without exudation and pleuritic adhesions occur. Fibrinous pleurisy may also be secondary to other pulmonary diseases, as tuberculosis, cancer, and pneumonia. In the former affection, pain, dry cough, and plain friction sounds are often the first symptoms noted. These signs are usually encountered at the base, but they may also be met with at the apex of the lung.

Serofibrinous pleurisy.—In this form besides the fibrin there is present a fluid exudate in greater or less amount, and this effusion occurs in perhaps 60 per cent. of all the cases of pleurisy. While the disease is commonly ascribed to chilling of the system from exposure to cold or getting wet, it is undoubtedly due to a microbe which finds the depression following a sudden or prolonged chilling favorable for its action. Many cases of acute pleurisy are tuberculous in origin, as are also a large proportion of the cases that ensue, secondarily upon cirrhosis of the liver, cancer and Bright's disease. In the exudates of primary acute pleurisy there have been found the bacillus tuberculosis, the pneumococcus and the streptococcus. In different series of cases reported by a number of observers, in over 60 per cent. the bacillus tuberculosis has been present. Where the pneumococcus has been demonstrated the effusion was generally purulent and the course favorable. The streptococcus exists with the septic form of pleurisy, which is the gravest of all.

The proportion of serous effusion and fibrin vary greatly in serofibrinous pleurisy. The serous fluid is of a deep amber color, clear or slightly clouded. The color may be deepened by the presence of red blood corpuscles. It is closely allied to blood serum in composition. It almost

solidifies upon boiling and may coagulate spontaneously. The effusion varies in amount from one pint to a gallon. The lung suffers compression in accordance with the quantity of liquid surrounding it. With a large amount of effusion it may be completely solidified. The contiguous organs are displaced by large effusions—more particularly the heart and liver.

The most common onset of pleurisy is with a chill, followed by fever, pain, and usually cough. The pain is about the nipple or under the arm. It is sharp and cutting and the breathing is shallow and restrained. The cough is dry and repressed and causes great distress. The fever is moderate, rarely going above 103° F.

The disease in its early stage is marked by pain, cough, shallow breathing, and the friction sound heard at the commencement of inspiration and at the end of expiration. Later, when effusion has taken place, the friction sound disappears, there is less mobility of the chest upon the side affected, and dullness on percussion in accordance with the amount of liquid effused. The dullness varies with the position of the patient, whether prone or sitting up, upon the back or side, etc. The apex beat of the heart is also displaced, either to the right or left as the effusion is into the right or left pleural cavity. The spaces between the ribs are obliterated, and there is absence of vocal fremitus. Ordinarily the symptoms subside at the end of a week or ten days, but shortness of breathing on exertion may last for a month or more. Sometimes in spite of treatment the effusion will reform and the case persist for months. Generally acute serofibrinous pleurisy terminates in recovery.

Empyema.—Pus in the pleural cavity. This is a result in certain cases of acute pleurisy. It is secondary to various infectious diseases, as scarlet fever, measles, whooping cough, tuberculosis, pneumonia and typhoid fever. The symptoms are those of blood poisoning, irregular fever, rigors, pallor, weakness, and perspirations, together with the signs of effusion already given. Empyema is a serious condition with a large mortality, but many patients recover under appropriate treatment. In a few instances a purulent effusion undergoes absorption, and it is possible for recovery to ensue from spontaneous discharge through the lung, or externally. The treatment is almost wholly surgical, the object being to remove the fluid.

Chronic pleurisy.—Under this heading is included, first, chronic pleurisy with effusion, in which the liquid may remain for months, or even years, without becoming purulent; and, second, chronic dry pleurisy. This latter follows absorption of the effusion, when there remains more or less fibrinous material which undergoes conversion into firm connective tissue, binding the pleural membranes together. As a consequence there is some flattening of the chest, deficient lung expansion, dullness on percussion and feeble breath sounds. There may be a

nagging pain at the base of the lung, or a stitch in the side, but the general health may not be much affected.

Following the acute form there may be a chronic dry pleurisy marked by the pleuritic friction which the patient can feel, and which results in adhesions of the pleural surfaces. These adhesions are very common and affect limited areas, or may involve the whole membranous extent.

Other forms of pleurisy are hemorrhagic and diaphragmatic. In the former, in connection with tuberculosis, cancer, Bright's disease, cirrhosis of the liver, and malignant fevers there sometimes occurs a bloody effusion into the pleural sac. In diaphragmatic pleurisy the trouble is limited to the membranes between the lower portion of the lung and the diaphragm. The pain is severe, is at the lower border of the ribs, and may fix the attention upon the abdominal organs rather than the pleural surface.

In the acute stage broad bands of adhesive plaster drawn tightly around the affected side, beyond the middle line, may afford relief from pain, and the ice bag may also be applied. If the pain is not relieved by these measures anodynes may be needed.

Hydrothorax.—This is simply a form of dropsy—an accumulation of serum in the pleural sacs as a result of other diseases. It is shown by difficulty of breathing. In renal and cardiac affections difficulty of breathing should direct attention to the pleura. Purging with salines usually reduces the liquid, but where necessary resort may be had to aspiration.

Pneumothorax.—Air in the pleural cavity. The presence of air alone in the pleural sac rarely happens, for it is almost always combined with serum—*hydro-pneumothorax,* or with pus—*pyo-pneumothorax.* It occurs in consequence of perforating wounds of the chest, from perforations of the lungs due to disease, as cancer and tuberculosis, and perforations of the lungs from the pleura, as in empyema. Usually it occurs suddenly and gives rise to very great difficulty of breathing, general distress and very rapid and feeble pulse. It is recognized by enlargement of the affected side with immobility of the chest wall, by a tympanitic note everywhere over the affected side, by feeble respiratory sounds, and by displacement of the apex beat of the heart. Measures to relieve the distress are first to be employed and then attention given to the causative agency.

PLEURO-, prefix, *plô′rō-* [Gr. *pleuron, pleura,* a rib, a side]: pertaining or relating to the side or ribs.

PLEUROCARPI, n. plu. *plô′rō-kâr′pī* [Gr. *pleura,* a rib or side; *karpos,* fruit]: in *bot.,* mosses with the fructification proceeding laterally from the axils of the leaves. PLEU′ROCAR′POUS, a. *-kâr′pŭs,* having the fructification springing from the axils of the leaves, or from the side of the stem.

PLEURODONT, n. *plô'rō-dŏnt* [Gr. *pleura*, the side; *odous* or *odonta*, a tooth]: in *zool.*, a term applied to certain saurians having teeth fixed by their outer sides to the sides of the jaw.

PLEURODYNIA, n. *plô'rō-dĭn'ĭ-ă* [Gr. *pleura*, the side or rib; *ŏdŭnē*, *pain*]: rheumatic or spasmodic pain in the side, arising from various causes. This affection of the intercostal muscles is characterized by acute pain in the side on taking a full breath or coughing, and by great tenderness on pressure. If it happens to be attended by slight febrile excitement, or by a cough, it is impossible to distinguish it from pleurisy, except by attending to the physical signs which characterize the latter disease. Cruveilhier maintains that 'pleurodynia is nothing more than adhesive pleurisy;' and in many cases of assumed pleurodynia, there is little doubt that the pain is due to old adhesions. The disease generally yields to local measures, such as blistering, or counter-irritation in a milder form by rubefacient liniments. A mixture of soap-liniment and chloroform rubbed over the affected part two or three times a day often gives relief. In the more persistent cases, leeches may be applied with benefit.

PLEURON, n. *plô'rŏn* [Gr. *pleuron*, a rib]: the lateral extension of the shells of Crustacea.

PLEURONECTIDÆ, *plū-rō-nĕk'tĭ-dē:* family of fishes included in Cuvier's order *Malacopterygii*, but belonging to the order *Anacanthini* of Müller's system (see MALACOPTERYGII), and remarkable for a character to which there is nothing similar in any other vertebrate animals, a lack of symmetry in the head, and for swimming not with the back uppermost, like other fishes, but with one side uppermost. The peculiar structure of the head adapts it to this mode of swimming, both eyes being on that side which is uppermost, as a result of transformation in early life, the young having the usual form and symmetry of fish. Some of the bones of the head become much distorted, but there is no lack of symmetry in those of the body. The sides of the mouth are unequal. The body is extremely compressed, whence the Pleuronectidæ are popularly termed *Flat Fish;* the back and belly being mere edges fringed by the dorsal and anal fins. The pectoral fins are generally unequal, also the ventral fins those of the lower side being smaller than those of the upper. The upper side is often brown, or of some darkish color, and variously marked; the lower side whitish. The color of the upper side generally corresponds so much with that of the bottom, close to which these fishes swim, that they readily escape observation; and on this chiefly they seem to depend for safety, though, when hard pressed, they raise themselves in a vertical position, and suddenly throw themselves upward and forward to some distance, but then resume their ordinary posture, and as close to the bottom as possible.

Their ordinary swimming is by a kind of undulating movement. They swim with great activity. They have no air-bladder. They abound chiefly where the bottom is smooth, either muddy or sandy. All are sea-fishes, but some are very common in brackish water, ascend rivers, and can be kept in freshwater ponds. Many are in great esteem for the table. The turbot, halibut, brill, plaice, and flounder are examples of this family.

PLEURO-PNEUMONIA, n. *plô′rō-nū-mō′nĭ-ă* [Gr. *pleura*, the side; *pneumones*, the lungs—from *pneō*, I breathe]: contagious disease affecting cattle; and one of the most dangerous maladies; a combination of pleurisy and acute pneumonia; called often the 'lung plague.' Among the first symptoms are a loss of appetite, extreme debility, feverish condition, dry cough, and diminished secretions. At a later stage there is shortness of breath, soreness of the lungs, appearances of severe pain, watery discharge from the nose, and either constipation or violent diarrhea. Treatment is of little avail, and as the disease is extremely contagious, should not be attempted. The animal attacked should be killed at once. The remaining animals of the herd should be either slaughtered at once, or rigidly quarantined at least 90 days, and should be made to breathe the fumes of sulphur a few minutes each day for several weeks. The feed and bedding in the stable should be promptly burned, and pastures in which sick animals have been kept ought not to be used for well ones for several months.

PLEURORHIZEÆ, n. plu. *plô′rō-rĭz′ē-ē* [Gr. *pleura*, the side; *rhiza*, a root]: in *bot.*, cruciferous plants having the radicle of the embryo applied to the edges of the cotyledons, which are called *accumbent*. PLEU′RORHI′ZAL, a. *-rī′zăl*, having the radicle applied to the edges of the cotyledons.

PLEUROTHOTONOS, a. *plô-rō-thŏt′ŏ-nŏs* [Gr. *pleurŏthĕn*, from the side; *pleura*, the side; *tŏnŏs*, tension; *teinō*, I bend]: applied to lateral convulsions, sometimes seen in cases of tetanus, the patient throwing himself from side to side; bent or stretched from one side.

PLEUROTOMARIA, n. *plō′rō-tō-mā′rĭ-ă* [Gr. *pleura*, the side; *tomē*, a notch or cutting—from *temnō*, I cut]: an extensive genus of shells, solid and few-whorled apertures somewhat square, with a deep slit in the outer margins.

PLEXIFORM, a. *plĕks′ĭ-fawrm* [L. *plexus*, interwoven, twisted—from *plecto*, I twist; *forma*, a shape]: in the form of network; complicated; entangled.

PLEXIMETER, n. *plĕks-ĭm′ĕ-tĕr* [Gr. *plēxis*, a striking, a blow—from *plēssō*, I strike; *metron*, measure]: in *med.* the piece of ivory, india-rubber, or the like, placed over such parts of the chest or abdomen as it may be necessary to tap on to ascertain the state of the parts underneath.

PLEXIOBLASTOUS, a. *plĕks'ĭ-ō-blăs'tŭs* [Gr. *plĕxis*, a plaiting; *blastos*, a shoot or sucker]: in *bot.*, applied to cotyledons that rise above ground in germination, but do not assume the appearance of leaves.

PLEXUS, n. *plĕks'ŭs* [L. *plexus*, twisted—from *plecto*, I twist]: in *anat.*, a network of vessels or nerves.

PLEYEL, *plī'ĕl*, IGNAZ: musical composer: 1757–1831; b. Rupperstahl, near Vienna. He studied music under Vanhall and Haydn, and made in early life an extensive tour in Italy, to hear the works of the best composers. In 1783 he was made *Capellmeister* of Strasburg Cathedral, and during the succeeding ten years composed most of the works on which his popularity rests. In 1791 he visited London, and composed there three symphonies. Two years afterward, during the frenzy of the French Revolution, he fell under suspicion, and in proof of his acquiescence in the new order of things, had to compose a musical drama for the anniversary of Aug. 10, which saved his life. After a long career in Paris as a publisher of music and pianoforte manufacturer, he retired to his estate near Paris, and there died. His compositions, consisting of quartets, concertantes, and sonatas, are full of agreeable melodies, sometimes light and trivial, but occasionally vigorous.

PLIABLE, a. *plī'ă-bl* [F. *pliable*, pliable—from *plier*, to fold or plait—from L *plicārĕ*, to fold: Gr. *plekein*, to weave: Ger. *flechten*, to plait: It. *piega*, a fold or plait]: that can easily be bent or folded; flexible; supple; easy to be persuaded. PLI'ABLY, ad. *-blĭ*. PLI'ABLENESS, n. *-blnĕs*, or PLI'ABIL'ITY, n. *-bĭl'ĭ-tĭ*, state or quality of being pliable; the quality of yielding to force or pressure without rupture; the quality of yielding to moral force or influence. PLIANT, a. *plī'ănt*, easily bent; readily yielding to force or pressure without breaking; easily yielding to moral influence; tractable; docile. PLI'ANTLY, ad. *-lĭ*. PLI'ANCY, n. *-ăn-sĭ*, the state of being pliant, in a physical or moral sense; easiness to be bent; flexibility.—SYN. of 'pliable': pliant; flexible; supple; limber; yielding.

PLICA, n. *plī'kă* [L. *plĭco*, I plait or knit]: in *bot.*, disease in plants, in which the buds, instead of developing true branches, become short twigs, and these in their turn produce others of the same sort, the whole forming an entangled mass; an undue development of small branchlets, giving rise to the appearance of large branches, as in birch and hornbeam. PLICA POLONICA, *pō-lŏn'ĭ-kă* [so named as peculiar to *Poland*, Lithuania, and Tartary]: in *human anat.*, disease of the scalp, in which the hairs become matted together by an adhesive and often fetid secretion, and which is prevalent in Poland, though it occurs sometimes in other countries. The hair on microscopic investigation is found infested with a fungus of the genus *Trichophyton*. The only treatment beneficial is removal of the hair, and strict attention to cleanliness; but as it is popularly believed in Poland that this affection affords a security from all other sickness and misfortune, it is often difficult to

persuade patients to have recourse to these means. See Küchenmeister's *Manual of Parasites*, vol. ii., pp. 148–152. PLICATE, a. *plī'kāt*, or PLI'CATED, a. [L. *plĭcātus*, folded, knit]: plaited; folded like a fan; in *bot.*, regularly disposed, as in the vernation of some leaves. PLI'CATELY, ad. *-lĭ*. PLICA'TION, n. *-kā'shŭn*, a folding up; a doubling up; in *geol.*, a bending back of strata upon themselves.

PLIED: see under PLY.

PLIERS, n. *plī'ĕrz* [F. *plieur*, a folder—from *plier*, to bend (see PLY)]: a kind of small pincers by which anything is firmly seized.

PLIGHT, n. *plīt* [W. *plygu*, to fold or bend: prov. F. *pleg*, a fold, a bending: connected with PLY, which see]: in *OE.*, a fold or plait: V. in *OE.*, to plait; to weave. PLIGHT'ED, a. interwoven.

PLIGHT, n. *plīt* [AS. *plikt*, danger, risk; *plion*, to risk, imperil: O.Dut. *plegen*, to experiment or try: Ger. *pflicht*, duty, oath—the same as PLIGHT, to pledge]: dangerous condition; distressed state; predicament; also in a good sense, as, in good plight.

PLIGHT, v. *plīt* [Ger. *pflicht;* Dut. *pligt*, duty: Dut. *pleghen*, to perform, to take care of]: to make a duty or obligation of a thing; to give as a proof of good faith; to pledge, as one's faith: N. pledge; gage. PLIGHT'ING, imp. PLIGHTED, pp. *plīt'ĕd*, pledged; formally promised. PLIGHT'ER, n. *-ĕr*, one who plights or pledges. *Note.*—The two preceding entries seem to be intimately connected in their origin.

PLINLIMMON, or PLYNLIMMON, *plĭn-lĭm'on:* mountain mass with three chief summits, in Wales, on the boundary between Montgomery and Cardigan, 11 m. n.w. of Llanidloes; 2,481 ft. in height. The name P. is said to be a corruption of the Celtic *Pumlumon*, signifying Five Rivers, and to be due to the fact that five rivers have their source in this mountain: one of them is the Severn, and another the Wye.

PLINTH, n. *plĭnth* [Gr. *plinthos*, a brick or tile, the base of a pillar]: in *arch.*, the lower projecting square base of a column, pedestal, or wall. PLINTHITE, n. *plĭnth'īt*, a mineral of a brick-red color.

PLINY.

PLINY, *plĭn'ĭ* (C. Plinius Cæcilius Secundus), called often Pliny the Younger: A.D. 61—about 115; b. at Novum Comum (Como); son of C. Cæcilius. He was young when he lost his father, and was adopted by his uncle, under whose care, and that of his mother, Plinia, and his tutor, Virginius Rufus, his education was prosecuted. Passionately devoted to literature, he wrote a Greek tragedy at the age of 13; studied eloquence under Quintilian; and became so famous for his literary accomplishments, that he acquired the reputation of being one of the most learned men of the age. His oratorical powers were considerable; in his 19th year he began to speak in the forum; and his services as an advocate before the court of the Centumviri and the Roman senate were in frequent request. He held numerous official appointments; served, while a young man, as *tribunus militum* in Syria, where he listened to the teaching of Euphrates the Stoic, and Artemidorus; was afterward *quæstor Cæsaris;* was pretor about 93; and consul 100, when he wrote *Panegyricus,* an adulatory eulogium of Emperor Trajan, and containing little information as to the author and his times. He was appointed, 103, propretor of the province Pontica, an office which he vacated in less than two years; and he also discharged the function of curator of the banks and channel of the Tiber. He was twice married, his second wife being the accomplished and amiable Calpurnia, granddaughter of Calpurnius Fabatus, and considerably younger than her husband, by whom she was much beloved. He had no children by either marriage.

Our knowledge of P. the Younger is derived mainly from his letters or *Epistolæ,* of which there are ten books. He collected them himself, and probably wrote many of them with a view to publication. They hold a high place in epistolary literature, and give us many interesting glimpses into the life of their author and his contemporaries. P. himself appears in them to considerable advantage, as a genial and philanthropic man, enamored of literary studies, and fond of improving his estates by architectural ornament. His ample fortune was liberally bestowed; and his slaves always found him an indulgent master. Infirm health impaired throughout life his constitution, which was naturally weak; but of the time or cause of his death we know nothing. Of the facts contained in his letters, however, the most interesting to us are those relating to the punishment of the Christians. Death appears to have been the penalty attached even to the confession of being a Christian; though the adherents of the faith admitted no other acts, on examination, than those of meeting on a fixed day before dawn, when a hymn of praise to Christ was sung, and taking an oath to avoid theft, adultery, breach of faith, and denial of a deposit. Nothing more unfavorable to them than this could be extorted by P. from two female slaves, reputed to be deaconesses, whom he put to the torture. P. having asked Trajan how he was to stop the spreading superstition, the emperor replied that no general rule could be laid down;

that he ought not to institute a search after persons supposed to be Christians; but if any were brought before him, and the charge was proved, they were to be punished, if still impenitent. The best ed. of P.'s *Panegyricus* and *Epistolæ* together, is that of Schaefer; of the *Epistolæ* alone, that of Gierig.

PLIN'Y (C. PLINIUS SECUNDUS), called often PLINY THE ELDER: author of the celebrated *Historia Naturalis:* A.D. 23—abt. 79; b. in n. Italy, either at Novum Comum (Como) or Verona. Como was certainly his family's place of residence, since he had estates in its neighborhood; his nephew, the Younger Pliny, was born there, and inscriptions relating to members of his family have been found near it. While young, he was sent to Rome, where his ample means and high connections secured him the best education. At the age of 23 he entered the army, and served in Germany as commander of a troop of cavalry under L. Pomponius Secundus, of whom, in later life, he wrote a memoir. He travelled over nearly all the frontier of that extensive province, visited the Cauci and the sources of the Danube, composed during the intervals of military duty his treatise *De Jaculatione Equestri,* and commenced a history (completed in 20 books) of the Germanic wars. On his return to Rome in 52 with Pomponius, he entered on the study of jurisprudence; but as his practice as a pleader showed no great capacity for the legal profession, he retired to his native place, where he spent the greater part of the reign of Nero in miscellaneous authorship. During this period he wrote his *Studiosus,* a treatise in three books on the training of a young orator from the nursery to his entrance on public life, and apparently intended to guide the education of his nephew; also his grammatical work, *Dubius Sermo,* in eight books. Shortly before Nero's death P. was a procurator in Spain, where, in 71, he heard of his brother-in-law's decease, and of his being intrusted with the guardianship of his nephew, Pliny the Younger, whom he adopted on his return to Rome before 73. Vespasian, the reigning emperor, whom he had known while serving in Germany, received him as one of his intimate friends; and at this period he completed, in 31 books, and brought down to his own time, the Roman history of Aufidius Bassus. His mode of study at this time was a model of systematic assiduity. When living in the busy world of Rome, he would begin his studies by candle-light in autumn at a late hour of the night, and in winter at one or two in the morning. Before daybreak he would call on the emperor, for whom he would proceed to execute various commissions; this done, he would return home, and resume his studies. A frugal meal would follow; after which he would, in summer weather, lie in the sunshine, and take notes or extracts from books read to him. The practice of jotting down important facts or observations was habitual with him, and he was often heard to say that there was no book, however bad, from which some good could not be got. A cold bath, followed by a light meal and a short sleep, occupied another interval, after which he

would study till the *cœna*, or dinner-time. Even at this meal some book was read to him, on which he would make comments. When in his country residence, he studied nearly all the time, except when in the bath; and even then, while his attendants were performing the duties incident to that luxury, he would be listening to some one who read to him, or he would be dictating to his amanuensis. When on a journey he was never without a secretary at his elbow, provided with a book and tablets. By this mode of life he collected an immense mass of materials, from which he compiled his great *Historia Naturalis*, published about 77. No fewer than 160 *volumina* of notes were found at his death, two years afterward. The great eruption which, in 79, submerged Herculaneum and Pompeii was at its height when he was stationed off Misenum, in command of the Roman fleet. Eager to examine the phenomenon more closely, he landed at Stabiæ, where he was suffocated by the vapors caused by the eruption. He was, as his nephew tells us, corpulent and asthmatic, and succumbed the more readily. None of his attendants shared his fate.

Of all his works, only his *Historia Naturalis* has come down to us. It comprehends a greater variety of subjects than we now regard as included under that title: astronomy, meteorology, geography, mineralogy, zoology, botany, everything which is a natural or non-artificial product, finds a place. Even to this elastic interpretation of the term, he does not rigidly adhere; the work being interspersed with digressions on such subjects as human institutions and inventions, and the history of the fine arts. It is divided into 37 books—the first being a dedicatory epistle to Titus, with a table of contents of the remaining books; and it embraces, as we are told in the preface, 20,000 matters of importance, extracted from about 2,000 volumes. Its scientific merit is not great: there is little attempt at philosophical arrangement; the observations nearly all are taken at second-hand, and show small discrimination in separating the true from the false, or the probable from the marvellous. His meaning is often obscure, from his writing of things with which he was personally unacquainted, and from his having missed the true sense of the authors whom he cites or translates. But it cannot be denied that the work is a great monument of industry and research—most praiseworthy as having been constructed and completed amid the labor of other onerous undertakings, and amid the distractions of active official employment; and most valuable as supplying us with details on a great variety of subjects, as to which we have no other information. The best critical editions of the text are those of Sillig (8 vols. 1851–57), Ian (1854–63; new ed. 1875), and Detlefsen (1867–75). There are several editions of the text with French notes, one by Grandsagne, with notes by Cuvier and others (1829), one by Littré (1848–50). Pliny's work has been translated into almost all European languages.

PLIOCENE, or PLEIOCENE, a. *plī'ō-sēn* [Gr. *pleiōn*, more; *kainos*, recent]: in *geol.*, a name given by Sir Charles Lyell to a section of the Upper Tertiaries, because the organic remains found in it contain between 60 and 70 per cent. of living species; a greater proportion than exists in the older Miocene, though not so great as that found in the succeeding Pleistocene.

As usual at the close of geological periods, disturbances of the earth's crust had occurred. The Miocene epoch ended with an elevation of deposits on the Pacific, forming the coast range; an uplifting of the Rocky Mt. region, drying up the great Miocene lakes of the plateau, and contracting those of the great basin and of the c. slope (where the fresh-water Pliocene deposits were afterward accumulated), and so raising the Atlantic and Gulf border that Pliocene beds of limited breadth and depth were formed only in N. and S. Carolina, and perhaps in part the beds of Yorktown and N. J. The P. has been named the Sumter Period from a locality in S. C. In s. S. Dakota and n. Nebraska, the Miocene 'White River Group' of the Bad Lands region, is covered by 300–400 ft. of P. beds, called the 'Loup Group.' It has been described as 'the great cemetery of the P.,' affording the bones of 3 species of camel; a rhinoceros; a mastodon, smaller than the quaternary one; an elephant that continued into the next period; 5 species of horse (*Hipparion*, *Equus*, etc.); a tiger as large as the Bengal; a wolf larger than any living; also deer, musk-deer, fox, beaver, porcupine, etc. The *Hipparion parvulum* was of the size of a goat; the *Equus excelsus* as large as the domestic horse. Of birds, there were an eagle, crane, and cormorant. The Oregon P. had a rhinoceros and peccary of its own. The S. C. P. has yielded a stag and mastodon, besides shells now mostly tropical, such as Cypræa, Conus, Fasciolaria. The shells of the Pacific border are described in Whitney's Survey of California. At the close of the P., the Tertiary elevation of the Rocky Mts. had reached 11,000 ft.; the continent had reached its full breadth; the Gulf of Mexico had even before the P. retreated from its Eocene border at the mouth of the Ohio to its present limits; and the Eocene climate, warm-temperate to the Arctic regions, was approaching the glacial cold that followed the Pliocene.

The beds belonging to this period are very local. They have been noticed in several places in Europe, but have been studied chiefly in Suffolk, the only locality in which they occur in Britain. Here they cover the upper beds of the London Clay; and being composed of shelly sand, they have, like similar deposits, been used for fertilizing lands deficient in calcareous matter, and have received the local name 'Crag.' They are divided into the (1) Red Crag, 50 ft.; (2) Coralline Crag, 50 feet.

The Red Crag consists of beds of quartzose sands and gravel with a mixture of shells, mostly rolled, and sometimes broken up into sand. The whole deposit, with the contained fossils, has a deep ferruginous or ocherous color. It seems to have been formed in shallow water, whose

currents have given it a very variable character, and frequently confused the stratification as in some modern sandbanks. The fossils have a boreal character. They consist chiefly of mollusca; but there have been found also the bones and teeth of large sharks, skates, and other fish, and the ear-bones of one or more true whales.

The Coralline Crag is generally calcareous and marly, consisting of a mass of shells and polyzoa, separated in some places by thin layers of hard limestone, and coral-like masses, which occupy the position in which they lived. It is easily distinguished from the Red Crag by its white color. It has been formed at greater depth and in more tranquil water than the newer deposit. The fossils have a more southern facies than those of the Red Crag, and indicate that they lived in an ocean with higher temperature. Among these southern forms are species of the genera Conus, Oliva, Mitra, Voluta, and Pyrula. The calcareous polyzoa are abundant and very beautiful; and several interesting forms of echini have been described. A few fossils of the same species as those in the London Clay have been found in this and the Red Crag; but these are believed to have been washed out of the inferior deposits. Searles Wood has obtained 345 species of testacea from the Coralline Crag, and 230 from the Red Crag, of which about 150 are common to both; about 70 per cent. of the newer division are recent, and about 60 per cent. of the older.

Pliocene deposits have been observed in the neighborhood of Antwerp and on the banks of the Scheldt, from which 200 species of shells have been obtained, two-thirds of which were already known from Suffolk. More than a half are recent species found in northern seas, and a few are still living in the Mediterranean. Similar deposits occur in Normandy. The low hills between the Apennines and the sea on each side of Italy are to a considerable extent formed of beds belonging to this period: and the marine strata of the seven hills of Rome are of the same age. Beds of a brackish-water origin, observed on the shores of the Caspian, Aral, Azof, and Black Seas, have been referred to this period.

PLIOHIPPUS, n. *plī'ō-hĭp'ŭs* [Gr. *pleiōn*, more; *hippos*, a horse]: a fossil horse found in the Pliocene beds, nearly allied to the recent genus.

PLIOSAURUS, or PLEIOSAURUS, n. *plī'ō-saw'rŭs* [Gr. *pleiōn*, more; *sauros*, a lizard]: genus of fossil sea-reptiles nearly allied to the Plesiosaurus, but having a very short neck, and comparatively a larger head. The jaws are furnished with stronger teeth, subtrihedral in cross section, with one side flattened, and bounded by prominent lateral ridges on the more convex side. The species are found in the Middle and Upper Oolite.

PLOC, n. *plŏk:* mixture of hair and tar for covering a ship's bottom.

PLOCARIA, *plŏ-kā'rĭ-a.* genus of *Algæ*, of the order or suborder *Ceramiaceæ*, having a cartilaginous frond, composed of large cells, as if jointed, and dividing into slender, tufted, and densely aggregated branches. *P. helminthochorton* is the CORSICAN Moss of the apothecaries' shops, formerly of some reputation as a vermifuge, but now little used, and believed to have little efficacy. It is a small plant, with a filiform entangled frond, and grows on the shores of the Mediterranean. It has a strong, marine odor and a salt taste. It consists in great part of a vegetable jelly or mucilage, which renders it nutritious, and contains much chloride of sodium, sulphate of lime, and carbonate of lime. As sold in the shops, it is always much mixed with other algæ.—*P. tenax* is a small plant with filiform, branched, and somewhat gelatinous frond, much used by the Chinese as a glue. It is used in China as food also.—*P. candida* is used as food in the East: it is popularly called CEYLON Moss. The frond is whitish and much branched, the branches long and somewhat clustered. It is exported to China from the islands of the Indian archipelago, forming a portion of the cargo of almost every junk. The Chinese make it into a jelly with sugar, and use it as a sweetmeat. It consists in great part of a vegetable jelly with considerable starch. It has been introduced into some western countries as a light and nourishing food for children and invalids, and is suitable particularly in irritation of the mucous surfaces.

PLOCE, n. *plō'sē* [Gr. complication—from *plekō*, I weave, I plait]: in *rhet.*, a figure by which a word is separated or repeated, by way of emphasis, so as not only to signify the individual thing denoted by it, but also its peculiar attribute or quality; as, his home is a home indeed.

PLO'CEUS: see WEAVER BIRD.

PLOCK, *plŏtsk* (Russ. *Plotzk*): government in n. Poland, bounded n. by Prussia, s.w. by Warsaw; 3,520 sq. m. About three-fourths of the people are Poles. Hills are in the north and on the banks of the Narew and Vistula, which with the Bug are the chief rivers. One-third of the surface is covered with forests, and there are many marshes and lakes. The inhabitants are engaged chiefly in agriculture, and in cattle and sheep breeding. Pop. (1880) 522,006; (1887) 600,662; (1897) 556,877.

PLOCK (Russ. *Plotzk*): town of Poland, cap. of the govt. of the same name on an elevation on the right bank of the river Vistula, 78 m. w.n.w. of Warsaw. Its principal buildings are the cathedral, built 961, the bishop's palace, theatre, etc. Agriculture, and export of grain to Danzig and other ports, are chief employments. Pop. (1885) 20,660; (1890) 23,568; (1897) 26,892.

PLOD, v. *plŏd* [Gael. *plod*, or *plodach*, a puddle. Ger. *pladdern*, to dabble or paddle: Dan. *pladder*, mire]: to travel or trudge slowly but steadily, as if through the wet, and over clods and mire; to work slowly or with laborious diligence; to toil heavily; to drudge. PLOD'DING, imp.: ADJ. diligent but slow; having the character of that which plods: N. slowness with steadiness and perseverance; the act of studying closely. PLOD'DED, pp. PLODDER, n. *plŏd'ẽr*, a dull, heavy, laborious man. PLOD'DINGLY, ad. *-lĭ*.

PLOJESHTI, *plo-jĕsh'tĭ*, or PLOYESTI, *plo-yĕs'tĭ*: town of Walachia, 35 m. n. by e. from Bucharest. It has considerable trade, and a great annual wool-fair. Pop. about 33,000.

PLOMBIÈRES, *plōng-be-ãr'*: town and watering-place in France, dept. of the Vosges, on the river Angronne; about 200 m. e.s.e. of Paris, 14 m. s. of Épinal. Plombières is frequented for its natural warm salt baths, esteemed from very ancient times. The waters are of varied qualities: there are cold ferruginous springs, tepid saponaceous, and hot saline; the first used as drinking water, the last two for baths. They are excellent for the skin and the urinary organs, and in gout, rheumatism, and paralysis. The Romans build bath-houses here, and royal personages have constantly patronized and improved the place. King Stanislaus of Poland, and Charles, Duke of Lorraine, built hospitals and laid out walks; but Emperor Louis Napoleon was the most munificent patron of P., and made of it probably the most ornate and perfectly equipped watering-place in the world. Permanent pop. 1,700.—Another P. is a small town in France (pop. 1,600), in the Côte-d'Or, 3 m. w.n.w. of Dijon, on the Lyons railroad.

PLONGÉE, *plawng-zhā'*, in Artillery and Fortification: a slope toward the front. Thus, in speaking of the course of a shell through the air, its plongée is from the point of greatest altitude to the point at which it strikes the earth. So, in fortification, the P. is the top of the parapet sloping gently toward the front. This slope is ordinarily 1 in 6; but a deviation is permissible between 1 in 9 and 1 in 4: the sharper the slope, however, the more liable is the crest of the parapet to be destroyed by an enemy's fire. Moreover, as flat a P. as possible is desirable, that sandbags may, when required, be laid upon it to form a cover for riflemen. See FORTIFICATION.

PLOT, n. *plŏt* [another spelling of PLAT, which see]: a small extent of ground; the ground occupied by a building; a plan or draft on paper: V. to make a plan on paper. PLOT'TING, imp.: N. the act or art of laying down on paper the several lines, angles, etc., of a tract of land that has been surveyed or measured. TO PLOT OUT, to lay out the ground for a design. PLOTTING-SCALE, a mathematical instrument used in plotting or setting off the length of lines.

PLOT, n. *plŏt* [a probable abbreviation of OE. *complot;* perhaps from Gr. *plĕkō;* L. *plĭco*, I twist or weave: comp. Bohem. *plot;* Pol. *ploty*, to braid hair]: the design of a future action; a secret scheme or design; a conspiracy; the knot or train of incidents developed in a story or a play; an intrigue: V. to plan or devise; to conspire against those in authority; to form a scheme of mischief affecting another. PLOT'TING, imp.: ADJ. contriving; forming an evil design: N. the act of contriving or forming schemes or evil designs. PLOT'TED, pp. PLOT'TER, n. *-ĕr*, one who plots; an intriguer; a contriver or conspirator. *Note.*—Accident has appropriated *plan* to a design of open action, *plot* to one of secret machination—Wedgwood.—SYN. of 'plot, n.': stratagem; intrigue; cabal; conspiracy; contrivance; combination; scheme; plan; form; method; design.

PLOTINIAN, a. *plō-tĭn'ĭ-an:* belonging to or connected with the doctrines of the Plotinists.

PLOTINUS, *plō-tī'nŭs:* most original and important philosopher of the Neo-Platonic school: 205–270; b. Lycopolis in Egypt. Such was his utter philosophic indifference to things human, 'being ashamed almost to live in a body,' that he never would divulge even his parentage. He would never allow his birthday to be celebrated, though he gave feasts on those of Socrates and Plato; nor would he ever permit a painter or sculptor to perpetuate his features, or, as he called it, to produce the image of an image—the body being to him only a faint image of existence. He deemed it tedious enough already to have to drag about this image whithersoever he went in this life. His body was altogether contemptible in his eyes; he would see no physician in his illness, and was very sparing in the use of food, refraining from meat, often even from bread. Strangely enough, his desire for the study of philosophy did not arise within him before his 28th year, when he repaired to Alexandria, and there, after having sat at the feet of the great masters for some time without feeling satisfied with their teachings, he at last became acquainted with Ammonius Saccas, and in him found the desired teacher. For ten years he zealously attended his lectures, and though he had agreed, with two of his fellow-students, never to make known aught of Ammonius's teachings to the world, he yet became the chief representative and author of that school, less as a pupil than as an independent thinker, who taking his stand upon its theorems, developed them to their full extent. In 242 he joined Gordianus's expedition to Persia, in order to study the philosophy of India and Persia; but the emperor being murdered in Mesopotamia, he had to repair hurriedly to Antioch, whence, 244, he went to Rome. There his lectures were attended by crowds of eager youths, and by men and women of the highest circles. Not only Platonic wisdom, in Neo-Platonic garb, but asceticism and the charm of a purely contemplative life, were the themes on which he, in ever-new variations, and with extraordinary depth and brilliancy, held forth; and such was the impression that his earnestness made on his hearers, that several of them

really gave up their fortune to the poor, set their slaves free, and devoted themselves to a life of study and ascetic piety. Dying parents intrusted their children and money to him, well knowing that a more honest guardian and one more anxious for his charges, could not be found. It is scarcely surprising to find that his contemporaries coupled with his rare virtues the gift of working miracles. Sixty years old, he thought of realizing Plato's dream by founding an aristocratical and communistic commonwealth like the latter's 'Republic'; and Emperor Gallienus was ready to grant the site of two cities in Campania for his 'Platonopolis'; but his courtiers prevented the fulfilment of this promise. Plotinus died at Puteoli, 66 years of age.

Although he began to write very late in life, he left 54 books of very different size and contents. His MS. being very carelessly written, he asked his pupil Porphyry to revise and correct it for him. The latter divided it into six principal divisions, each subdivided into nine books or *Enneads*. The most important parts are those which treat of Beauty, Fate, Immortality of Soul, the Good or One, the Three Original Substances, of Free Will, against Gnostics, of Providence, of the Genesis of Ideas, of the Influence of the Stars, of the Supreme Good, etc.

Plotinus's system was based chiefly on Plato's theorem of the Ideas; only that while Plato assumed the Ideas to be the link between the visible and the invisible, or between the Supreme Deity and the world, Plotinus held the doctrine of Emanation, that is, the constant transmission of powers from the Absolute to the Creation, through several agencies, the first of which is 'Pure Intelligence,' whence flows the 'Soul of the World,' whence again, the souls of 'men' and 'animals,' and finally 'matter' itself. Men thus belong to two worlds, that of the senses and that of Pure Intelligence. It depends on each man, however, to which of the two worlds he will most direct his thoughts, and to which of the two he will finally belong. The ordinary virtues, e.g., justice, moderation, valor, and the like, are only the beginning and very first preparation of our elevation into the spiritual realm; purification or the exercise of *purifying* virtues, is a further step, to which we attain partly through mathematics and dialectic; and the abandonment of all earthly interests for those of intellectual meditation, is the nearest approach to the goal. The higher the soul rises in this sphere of intellect, the deeper it sinks into the ocean of the good and the pure, until at last its union with God is complete, and it is no longer thought but vision and ecstasies which pervade it. These are a few snatches of Plotinus's philosophical rhapsodies, to which may be further added his mysterious belief in a kind of metempsychosis, by which souls, not sufficiently purified during life, return

after death, and inhabit according to their bent, men, animals, and even plants. He further held views of his own respecting gods and demons, whom he divided into different classes, according to their degrees; and professed faith in Mantic, astrology, and magic, the conviction of whose truth he derived from his theory of the harmony in the intellectual world, reflected by the material world. Yet it is clear from his dicta on these subjects that he did not believe in these so-called sciences in the gross sense of the herd, but that he had a vague knowledge of those mysterious laws of attraction and repulsion which go through nature. P.'s philosophy, which sought to combine all the systems of Anaxagoras, Parmenides, the Pythagoreans, Plato, and Socrates, and the Stoa into one, was the last and boldest attempt of the ancient Greek world to explain the mystery of the creation and of existence. Its influence on modern philosophy is remarkable. From Spinoza to Schelling the reminiscences of P., irrespective of the drift of particular parts of their systems, recur constantly.

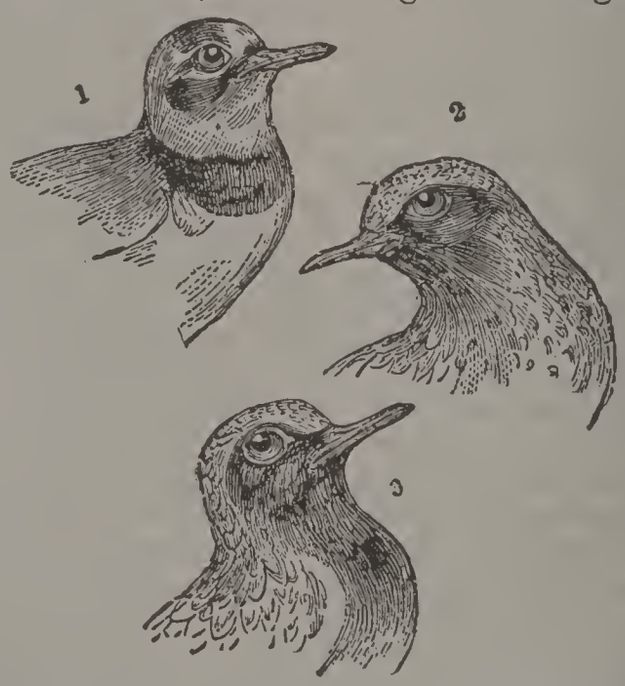
P.'s works were nearly forgotten, when Marsilius Ficinus first published a Latin paraphase of them (Florence 1492), followed by the *Ed. Pr.* of the original (Basel 1580 and 1615). The first critical ed., however, is due to Creuzer (Oxford 1835, 3 vols.). Others are those of Dübner (Paris 1855) and Kirchhoff (1856). Parts of his works were translated into German by Engelhard (1820); into English by Taylor (1794 and 1817); into French by Bouillet (1861). See Kirchner, *Die Philosophie des P.* (1854).

PLO'TUS: see DARTER.

PLOVER, n. *plŭv'ėr* [F. *pluvier;* It. *piviere,* a plover—from L. *pluvĭālis,* rain-bringing; *pluvia,* rain—so called in allusion to its alleged restlessness before bad weather]: bird of family *Charadriadæ* (q.v.), having a straight compressed bill; the upper mandible alone slightly inflated and slightly bent at the point; the nasal groove extending about two-thirds of the length of the bill, the nostrils longitudinally cleft near the base; the legs not very long, naked a little above the tarsal joint; the wings rather long and pointed, the first quill feather the longest. The species are numerous, and are found in every quarter of the globe; many are birds of passage. They frequent low moist grounds, where they congregate in large flocks, and feed on worms, mollusks, insects, etc.; but some visit mountainous regions and plains in the breeding-season. They fly with great strength and rapidity, and run with swiftness. The flesh and eggs of many of them are esteemed delicacies. The genus *Charadrius* has no hind toe. The AMERICAN GOLDEN PLOVER (*C. Dominicus*), known also as Field P. and Bull-head, is black above, speckled with yellow, usually with white also; below, brownish-black, or in winter grayish-white, the breast mottled; found in N. America generally, and a favorite game-bird. The European Golden P. is smaller with more yellow on the head. The Asiatic is similar; but, unlike both the above, has the wing-lining white; it occurs in Alaska. The genus *Squatarola* has a small hind toe: it is represented by the BLACK-

BELLIED P. (S. *helvetica*), called also the Swiss P., the Whistling Field P., or Ox-eye; spotted blackish and ashy-white above, black below; seen in autumn and spring, mostly coastwise. The genus *Ægialites* is not spotted above, nor extensively blackish below, but has dark rings on neck or breast. The KILDEER P. has two black rings (female and young, gray), bill black, rump chestnut; common in the w. especially; named from its cry. WILSON'S P. is sandy above, white below, no complete breast-bar; found coastwise. The rest have black-tipped yellow bills, e.g., the RING P., or Semipalmated, web to second joint of middle toe; plentiful in autumn flocks on the coast. The PIPING P. (neck-band incomplete), e. of Rocky Mts., beyond which the SNOWY RING P. takes its place, with black bill and no complete collars. The genus *Podasocys*, large, long-legged, and no collars, includes the PRAIRIE or MOUNTAIN P., found on the w. plains to the Pacific.—The genus *Vanellus*, Lapwings, occurs only in Greenland; it is the European species. The SURF BIRD (well developed hind toe) belongs to the Pacific coast.

The EUROPEAN GOLDEN P. exhibits great restlessness on the approach of wet and stormy weather, whence its specific name *pluvialis*.—The RINGED P. (*C. hiaticula*), a much smaller bird, not so large as a song-thrush, is

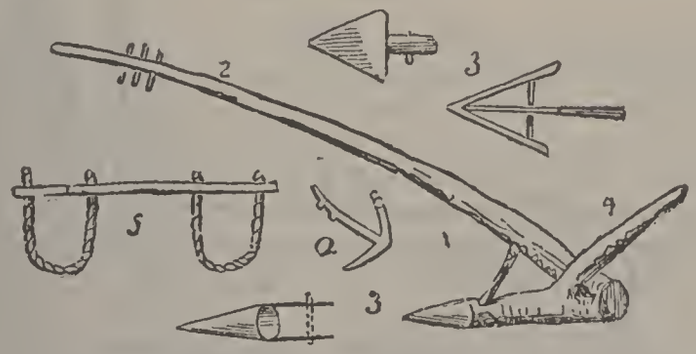


1, Ringed Plover; 2, Gray Plover; 3, Golden Plover.

found on shores, frequenting sandy and shingly flats from which the sea retires at ebb-tide. It is found in most of the northern parts of Europe and Asia, and in Iceland and Greenland. It is grayish-brown above, whitish beneath with a collar of white round the neck, and below it a black—in winter, a brown—collar; a white bar on the wing. Very similar, but smaller, is the KENTISH P. (*C. Cantianus*); and also similar and of similar habits is the smallest of the British species, the LITTLE RINGED P. (*C. minor*). To the genus *Squatarola* belongs the GRAY P. (*S. cinerea*). Another foreign species is the Dotterel (q.v.).

PLOW, or PLOUGH, n. *plow* [Dan. *plög*, a peg or stake, *plov*, a plow: Sw. *plig*, a peg, a stake; *plog*, a plow: Ger. *pflug;* Pol. *plug*, a plow: Ger. *pflock*, a peg: Gael. *ploc*, a block of wood, used as the original plow]: implement drawn by horses or oxen for turning up the soil of a field (see below): *figuratively*, agriculture or tillage; a bookbinder's tool for cutting the edges of books: V. to turn up the earth in a field with a plow; to furrow; to run through, as the sea in sailing; to cut or groove with a bookbinder's tool of the same name; in *Scrip.*, to labor in a calling. PLOW'ING, imp.: N. the act or operation of tilling a field with a plow. PLOWED, pp. *plowd:* ADJ. turned up with a plow. PLOWABLE, a. *plow'ă-bl*, that may be plowed; arable. PLOW'ER, n. *-ẽr*, one who plows. PLOWBOY, a boy who assists in plowing; a country boy. PLOW-GATE, or PLOW-GANG [Scot. *gate*, or *gang*, a road or way]: as much land as can be tilled by one plow in a year, generally about 40 Scotch acres. PLOW-LAND, arable land; as much land as a team can plow in a year. PLOWMAN, one who holds or manages a plow; a rustic; a husbandman. PLOW-MONDAY, the Monday after the Feast of Epiphany or the end of the Christmas holidays. PLOWSHARE, n. *-shär*, the blade or iron plate in a plow which cuts the bottom of the furrow and raises a slice to the *mold-board*, which turns the earth over—the blade in front of the share is called the *coulter* [L. *culter*, a knife]. PLOW-TAIL, the hind part of a plow. TO PLOW IN, to cover by plowing. TO PLOW ON THE BACK, in *Scrip.*, to persecute or torment. TO PLOW WITH ONE'S HEIFER, in *Scrip.*, to obtain something from a husband by an application made through the wife. *Note.*—PLOW is said by Max Müller to be connected with Skr. *plava;* Gr. *ploion*, a ship, which is as it were the plow of the sea; but this is somewhat fanciful.

PLOW, or PLOUGH: one of the most important implements in agriculture. The time of its invention is unknown, but it was in use certainly at a very early period.



1, An ancient Plow; 2, its pole, where the oxen are attached; 3, shares of various forms; 4, the tail or handle; 5, the yoke; *a*, early Greek Plow.

It is mentioned in the Mosaic writings, as early probably as B.C. 1451; and figures on ancient monuments indicate that it was in common use in Assyria, Babylon, and Egypt in the early ages of the world. At first the P. was nothing but a crooked branch of a tree, with a sharp, projecting

point. With some modifications, in many cases very slight, this style of P. was used for a long period. Even now in n. India, Moroeco, and other partially civilized countries, the form of the P. is almost the same as it was in the olden time. In portions of n. Europe plows of extremely rude form and workmanship are still employed, and it is only a eomparatively short time since improved plows in Great Britain and the United States superseded the elumsy implements of wood long in use.

The early Greeks had a P. which, though eoarse and rude, was made in various parts, was furnished with wheels, and was a marked improvement over the original form. The Romans were an agrieultural as well as a warlike people, and gave mueh attention to the eonstruetion of the P. and to the various purposes for which it eould be used. They not only prepared the soil for reeeption of the seed by the use of the P., but they had forms of the P. for opening trenches in which to deposit the seeds of plants to be grown in rows, and other forms for eovering the seed after it had been sown. On some of their plows they used mold-boards, while others were without them; the shares were made broad or narrow, aeeording to the kind of land to be plowed; eoulters were used on some forms and omitted on others; and they had plows with wheels and without them. They also made plows with shares having high and sharp tops for eutting the soil, an improvement

Egyptian Plow.

Roman Plow.

sometimes eredited to modern invention. At an early period in British history, special laws were made regarding plows and plowing. One of these enactments was to the effect that before a man should hold a P. he must learn how to make one. The driver was also required to make the

ropes of willow twigs, by which the P. was drawn. By one of these peculiar statutes, oxen were the only animals which could be used for drawing the P.; but at one period the Saxons used horses, which they fastened to the P. by the tail, a barbarous custom, which was finally prohibited by statute. Some of the plows used by the Saxons had wheels, but otherwise they were of very simple construction. The Normans also used wheels on some of their plows; but the inferiority of the work performed with them is attested by the fact that either the plowman, or some one by whom he was accompanied, carried a kind of hatchet with which to break the clods which the P. upturned. The Peruvians used rude plows drawn by several men, but most of the nations of antiquity used oxen for plowing. The horse is not mentioned in the Bible as used for this purpose, and as late as the middle of the 16th c. oxen were employed almost to the exclusion of other animals. At the present day, even in the countries in which agriculture has reached its most advanced position, oxen are largely used for plowing.

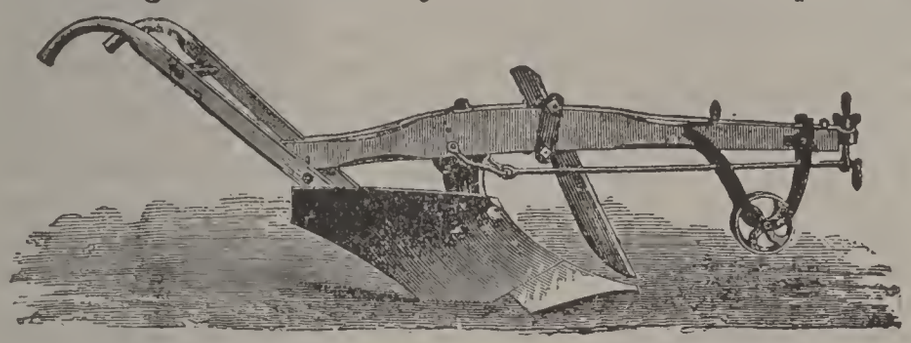
Modern Syrian Plow.

Notwithstanding the various changes and improvements in the style of the P., and in the methods of its construction, nothing approaching perfection was attained till toward the close of the 17th c., when the Dutch made important changes in its form. This model was taken to England, where it was still further improved. Under the direction of Walter Blythe, an agricultural author of considerable reputation, a P. was made at Rotherham, for which a patent was secured 1730, after it had been long in use. This implement was far superior to any previous model. It was called the Rotherham P., and though largely of wood, has been used till a very recent period. About 30 years after the patent was issued for the Rotherham P., James Small, of Scotland, invented the cast-iron mold-board, and succeeded in making a P. more nearly in accordance with mechanical principles than any of his predecessors had done. Till 1785 the share of the improved forms of the P. had been made of wrought-iron. In this year a patent was

secured for making it of cast-iron, and 1803 the valuable improvement of case-hardening the under side of this portion of the P. was patented. The latter change allowed the upper portion of the share to wear away much more rapidly than the lower part, and thus caused the cutting part of the P. to be self-sharpening. The first cost of the share was also reduced, and there was great saving of the time required for making repairs. In some patterns the beam and larger portions of the handles were made of iron instead of wood, but this method has never come into universal use, and the best makers of the present day, while supplying both styles, sell many plows with wood beams and handles. An attempt to make a double P. was noted by Walter Blythe 1649, and at a little later date a form of subsoil plow was made by 'an ingenious young man of Kent.' But these, as well as all other styles, till a very recent period, were rude in construction and unsatisfactory in working.

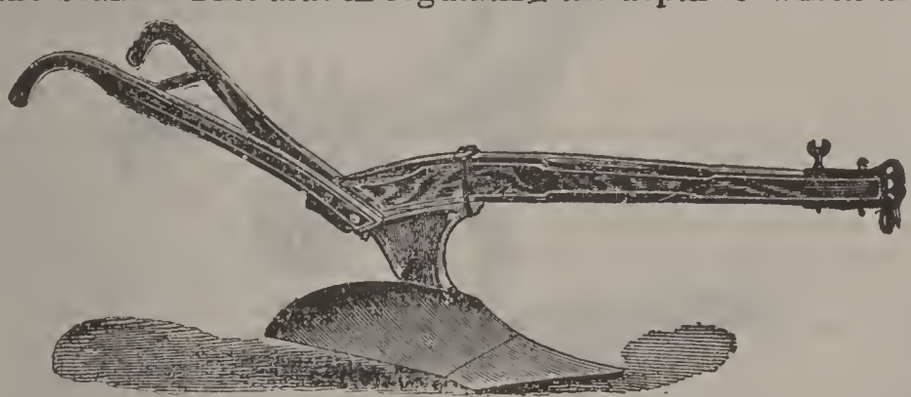
The plows used by the colonists of this country were poorly made, and very imperfectly answered the purpose for which they were designed. In 1617 the first plows brought from England to America were landed in Va. The Plymouth colonists did not have a P. for about 12 years after their settlement was made, and for a long period only a few plows were obtained. To avoid the expense of purchasing plows many farmers hired them of the few whose more ample means enabled them to own these implements. These plows were large and heavy, and a strong team, two men, and a driver, were required to use one with any success. The first plows manufactured in the colonies were not only of imperfect pattern, and largely of wood, but the metallic portion was of very inferior material. About 1788 Thomas Jefferson commenced a series of experiments, which he continued several years, with the hope of improving the form of the mold-board of the bull-tongue P. then in common use in Va., and there is reason to believe that his son-in-law, Col. Thomas M. Randolph, invented the first swivel P used in America. In 1797 Charles Newbold of N. J. obtained a patent for a cast-iron P. Minor changes were made by various parties, and about 1805 a style of P. was made with a steel-edged wrought-iron share, and a land-side and mold-board each of cast-iron. Jethro Wood of N. Y. made marked improvements 1819, and since that date there has been a rapid progress toward perfection of form and finish, and adaptation to the purposes of cultivation. Notwithstanding the progress of invention, the expense of the improved implements, the fact that the new styles of P. were at first sent out with very rough surfaces which it required considerable time to wear smooth and which it was difficult to polish in sticky soils, together with a natural reluctance on the part of many people to try new inventions in the agricultural line, made the introduction of the new models slow and difficult. Large numbers of plows made chiefly of wood, with the wearing surfaces covered with sheet-iron, were used in the United States till nearly the middle of the 19th century.

At the present time plows are made for a large numbe. of special purposes, and of each principal division there are many forms. Each maker has his own patterns, and claims certain advantages for his styles over those of his competitors; though there are, of necessity, many points in which they bear a rather close resemblance. Certain parts are necessary to the construction of a P. which will work satisfactorily, and the possible range of variation in form and arrangement is not very wide. The essential parts of



Sod Plow.

a common P. are the handles, beam, standard, share, land-side, mold-board, and a clevis (at the end of the beam farthest from the handles), to which the draught-chain or evener is attached. The various parts are fastened together with bolts. In some forms of the P. the point is an integral part of the share, in others it is cast separately. The P. for turning sod requires, in addition to the parts above named, a coulter, usually in the shape of a knife-blade, but sometimes circular. This cuts the turf, thus lightening the draught and insuring a furrow-slice of uniform width. In many cases a wheel, which can be raised or lowered, is attached in front of the coulter near the end of the beam. This aids in regulating the depth to which the

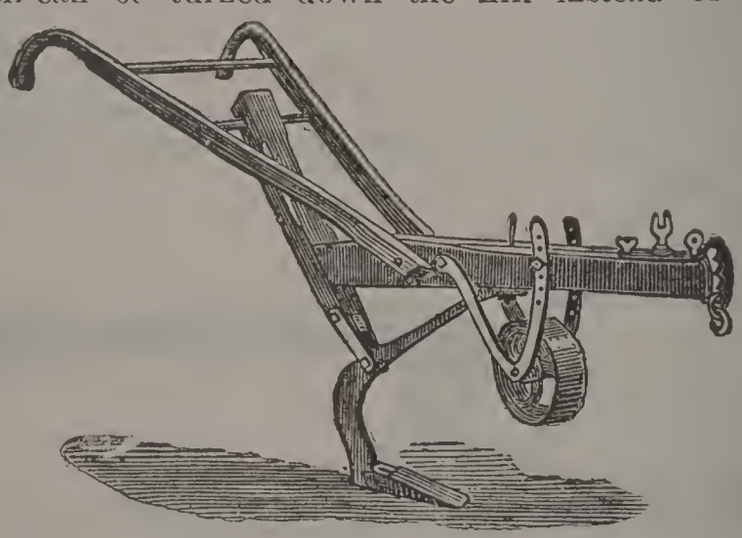


Stubble Plow.

P. will run, and also tends to steady its motion in the soil. The P. is made either right-hand or left-hand. In the former case the mold-board is on the right-hand side and turns the furrow to the right. In the latter the mold-board is on the other side and the furrow is turned to the left. The majority of plowmen prefer the right-hand style.

The sod P. needs a long mold-board with a gradual turn in order to raise the furrow-slice easily and lay it over

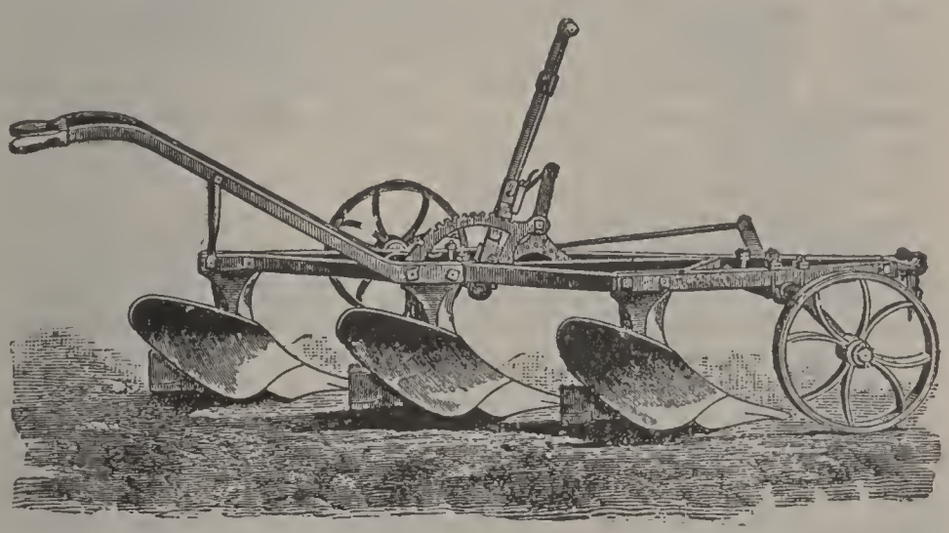
in a continuous strip. For stubble land, a P. with shorter mold-board and sharper turn is desirable, as this will insure more thorough loosening and pulverization of the surface soil, as well as its inversion. The form of the share also does much to modify the draught and to determine the degree of ease in managing the P. in the soil. If there are strong roots of grass or bushes in the ground, the share should be broad and be kept constantly sharp; but if there are many stones the form should more closely approach that of a wedge. On wet soil it is sometimes desirable to lap the furrows somewhat, in order to furnish room for the surplus water underneath the inverted sod, and also to hasten the decay of the turf. When the P. is not constructed specially for this purpose, the desired object can usually be secured by regulating the angle of the coulter and the width of the furrow. If the former is set nearly straight and the latter is about one-half greater in width than in depth—a matter which can be readily adjusted by moving the clevis, or in some plows by moving the beam to the right or the left on the standard to which it is fastened—the furrows will have a decided lap. But if the point of the coulter is set far forward and the width of the furrow is about twice its depth, the inverted sod will be laid very nearly level. Swivel plows, which by means of a reversible mold-board are capable of being used as either right-hand or as left-hand plows, were introduced many years ago. For a long time their use was confined to hilly land, and as by this style of P. the furrows all can be turned down the hill instead of half of



Subsoil Plow.

them being turned up the slope as by the ordinary P., they were popularly known as 'side-hill' plows. Of late years great improvements have been made in their construction, and many of these plows are now used on level ground. By their use the 'dead,' or open, furrows which are made in the centre of a field which is plowed on both sides are avoided, as are also the ridges which occur where the first furrows are laid with the other style of plow. There is the added advantage of having the plowed portion of the field kept together as the work progresses, instead

of having it separated by an unfinished strip when the work is done by plowing around the field. The subsoil P. is used in heavy ground for loosening the soil beneath that portion affected by the ordinary implement. As the subsoil is usually much less fertile than the surface layer, it is not, in ordinary cases, desirable to bring it to the top; but loosening it to a depth of several inches below the bottom of an ordinary furrow enables the field to withstand much better than it otherwise could do the extremes of drought and moisture. The roots of the plants being thus enabled to pass through the entire surface soil, and also a portion of the underlying ground, have a greatly enlarged range. This P. is made without either share or mold-board; it is drawn usually by a team which immediately follows the one which opens the surface furrow, but a form combining in one implement the surface and the subsoil P. is sometimes employed. The trench P. runs to a much greater depth than the ordinary implement, but differs from the subsoil P. in that it brings to the surface a



Gang Plow.

portion of the material which the former only loosens. One of the most popular implements of the kind was known as the Double Michigan P. Of the two plows which in this style were fastened to a single beam, the one in front cut and turned into the furrow previously made a thin layer of turf; while the second one, of greater size, rolled a large quantity of loose earth over the inverted sod. The heavy draught proved a strong objection to this P., and it has been largely superseded by what is known as the jointer—a double P. in which the first part is very small, and merely turns a narrow strip of the turf, which is covered by the large P. which follows. A P. with a mold-board on each side is often used for making trenches in which to plant potatoes or other crops, to throw loose earth toward growing plants, for opening water furrows, and for various other purposes. Special forms of the P. are made for ditching, making underground channels for water in clay soils, paring the turf in order to cut off the roots of weeds, reclaiming land containing stones and

bushes, and for other uses. There are also various implements known as pulverizers, and spaders, which are designed to answer with still greater efficiency the purposes of the P., though departing widely from the form of that implement. Among the great modern improvements in plows are the gang P., by which two or more furrows may be turned at one passage of the team, the implements being fastened to a single frame; and the sulky P., in which the implement is mounted on wheels, by which means the labor of the plowman is lightened, and the draught is greatly decreased.

The draught and the quality of the work performed by the P. depends very largely on the form of the implement. A slight change in the setting of the beam or the handles, in the length or curve of the mold-board, or in the form of the share, may greatly increase the draught, add to the difficulty of managing the implement, and to a still greater degree reduce its efficiency. A lack of proper adjustment of a P. which has been correctly made not infrequently leads to its condemnation. If the clevis is set so as to carry the P. too much to land, to cause it to cut too narrow a furrow, or to allow it to run too deep or too shallow, the work will be poorly done and the labor of the team and the man who holds the P. will be increased. Lengthening the draught-chain increases the labor of drawing the P. and causes it to take a deeper furrow. Raising the ring in the clevis has the same, and lowering it the reverse effect on the depth to which the P. will run. Turning the clevis to the right or left carries the P. to or from the land, and the same purpose is served by a slight right or left hand change in the position of the beam on the standard. As the point and edge of the share become worn the depth of the furrow is lessened. Raising the wheel at the end of the beam also allows a deeper furrow to be taken, while lowering it makes the furrow more shallow; but it is not well to make an adjustment that will bring a heavy pressure on the wheel. The wearing surfaces of plows are made of cast-iron, chilled iron or steel. Of these the first named is greatly inferior to either of the others. Among indispensable requisites of a first-class P. are strength, light weight, easy draught, correct form, and good workmanship. A P. which will run five to six inches deep should turn a furrow 9 to 12 in. wide; and one cutting seven to ten in. deep should turn a width of 14 to 18 inches. Plows taking smaller furrows are made to be drawn by one horse; for heavy teams large implements are made which will turn furrows two ft. wide, and there are many intermediate sizes.

Many efforts, some very successful, have been made to use steam as a motive power for the P.; but the great expense involved in obtaining an outfit, and the inconvenience of using it in a small field, have prevented its general introduced, though to some extent the steam P. is used in England, the Indies, and the western United States. As early as 1769, application for a patent for a machine to plow without animal power was made in England; and 1810 one was secured for a steam P. moved by two engines, one at each

end of the field, the P. being drawn by an endless rope. This also had the system, used in later devices, of a double set of plows pointing different ways, one of which should work while being moved in one direction, and the other on the return trip—the set not in use being raised above the ground. In 1832 a patent was obtained for a steam P. propelled by a single engine, and having a carriage at the other end of the field, with which an endless rope to draw the P. was connected. Other patents were issued, and in 1864 John Fowler introduced a style of steam P. which was moved by two engines, at opposite ends of the field, and which was quite successful. Since that time these methods, in some cases slightly modified, have been employed. The

Steam Plow.

single engine involves the least expense, but the outfit requiring two engines is more readily placed in position and economizes the power much better than the other. From two to eight furrows are turned at each passage of the P. across the field. Traction, or locomotive, engines to pass over the field and draw a gang of plows have been more recently patented, and are used to some extent in England and in a few of our w. states. Though plowing by steam in this country has only recently passed the experimental stage, engines and plows are now so well constructed and so fully adapted to the work required, that their extensive use on the large farms at the w. in the near future can be confidently predicted. During the last three

or four years these plows have proved their usefulness and greatly increased in popularity. Where the ground is nearly level, reasonably free from stones and other obstructions, and is in a moderately fair condition for working, the steam P. is very successful. Among its advantages are rapidity of performance; economy, when large fields are to be plowed; and the ability to give deeper and more thorough tillage than can be effected by less powerful means. Besides, the greater speed with which the work can be performed makes it often possible to wait for the ground to dry if too wet, or to delay for rain when it is too dry and hard to be easily plowed. If important to work it at once, the land can be broken by a steam P. when in a condition which would utterly preclude the use of horse-power. A ten-horse power traction engine will draw a gang of four 14-inch plows in a stiff, dry sod, and will readily carry a gang of five such plows in ordinary land. With such an engine, running at a speed of $2\frac{1}{2}$ m. an hour drawing four 12-inch plows, $1\frac{1}{5}$ acres can be plowed per hour; with five 12-inch plows, $1\frac{1}{2}$ acres; with four 14-inch plows, $1\frac{2}{5}$ acres; and with five 14-inch plows, $1\frac{3}{4}$ acres. The gangs are so constructed that one of the plows can be removed when, on account of unusual hardness of the ground or a desire to give deeper tillage, it is important to lighten the draught. The plows are readily adjusted to width and depth of working, and the only attention that they then require is to throw them in and out of the furrows at the end of the field. This is readily done by one man, another can easily attend to the engine, while a boy and team can bring water and fuel. The plows are made right or left hand according as the guiding-wheel of the engine is on the right or left side. The engines are so constructed that they can be used for driving threshers, saws, ensilage cutters, and other farm machines, as well as for plowing.

The purpose for which the *P.* is used is not limited as has sometimes been supposed, to a more or less perfect inversion of the surface soil, but has a much wider and more important range. By this inversion the sod and weeds growing upon the surface are covered so as to be out of the way in cultivation of the crops, and by their decay they furnish food for plants. The turning to the surface of some of the lower strata of the soil is beneficial also in bringing within their reach soluble elements of fertility which had settled so low as to be out of the reach of the roots of young plants. But, in addition to all this, one of the principal objects to be secured by the use of the P. is the pulverization of the ground, by which means the plant roots are enabled to pass more freely through the soil, the plant food contained in the land is made finer, and thus brought into better condition for use, and a much larger quanity of the soil is exposed to the disintegrating action of the weather, by which means elements of fertility previously locked in the ground are liberated and made available for the use of plants. By the judicious use of the P

it is possible also to gradually deepen the soil and thus considerably increase its productive capacity.

Though the P. is an invaluable implement for performing the heavy work of tillage, it is not sufficient of itself to put the land into the best possible condition for receiving the seed, or to give the kind and degree of cultivation which the growing crops require. For these purposes it must be followed by the Harrow (q. v.), cultivator, or other implements of tillage.

PLOYE, a. *plwâ-yā'* [OF. *ployer*, to bend, to ply]: in *her.*, bowed and bent.

PLUCK, v. *plŭk* [Dut. *plucken;* Dan. *plukke*, to pick, to gather: Sw. *plocka;* Ger. *pflücken;* AS. *pluccian*, to pluck]: to pull with sudden force; to pull off, out, or up; to snatch; to reject a candidate for a university degree through his not being able to pass the necessary examinations: N. [probably so called because they are *plucked* out of the animal after death]: the heart, liver, and lights of an animal. PLUCK'ING, imp. PLUCKED, pp. *plŭkt:* ADJ. rejected in an examination; stripped of feathers or hair; robbed by sharpers. PLUCK'ER, n. *-ėr*, one who. CROW TO PLUCK, a dispute to settle; a complaint to make. TO PLUCK DOWN, to pull down; to demolish; to reduce to a lower state. TO PLUCK UP, to tear up by the roots; to eradicate.

PLUCK, n. *plŭk* [from PLUCK 1, in the sense of the 'heart,' the principal part of that named 'the pluck,' being the seat of courage]: courage; spirit; bravery. TO PLUCK UP ONE'S HEART, to begin to act boldly and courageously; no longer to give way to despondency or despair.

PLUG, n. *plŭg* [Dut. *plug*, a bung or peg: Ger. *pflock*, a plug: Sw. *plügg*, a peg: Fin. *pulkka*, a peg, a wedge: Gael. *plucadh*, to plug; *ploc*, a bung]: a piece of wood or other substance used to stop a hole; a stopple; a large peg: V. to stop with a plug; to make tight by stopping up a hole. PLUG'GING, imp.: N. the introduction of a mass of lint or other substance into the cavity of a wound to stop bleeding; the substance thus used. PLUGGED, pp. *plŭgd.*

PLUM, n. *plŭm* [Ger. *pflaume;* AS. *plûme*, a plum—from L. *prunum*, a plum]: a well-known fruit containing a nut, which, when dried and preserved, is called a *prune*, the tree itself being the *Prunus domes'tĭcă*, ord. *Rosăcĕæ* (see below): a raisin: in *familiar slang*, a handsome fortune. PLUM'CAKE, a sweet cake containing raisins, currants, and spice. PLUM-PUDDING, a pudding containing raisins or currants, or both. PLUM'MY, a. *-ĭ*, containing plums, or resembling plums. PLUM-PUDDING-STONE, a term originally restricted to a conglomerate of flint-pebbles, polished sections of which had a fancied resemblance to the fruit in a slice of plum-pudding—now loosely applied to any conglomerate.

PLUM (*Prunus*): genus of trees and shrubs of nat. order *Rosaceæ*, suborder *Amygdaleæ* (q.v.), or *Drupaceæ;* the species of which have the bell, or urn-shaped, 5-cleft calyx deciduous, and the drupe fleshy, with a bony stone. Among N. American native species are the WILD YELLOW or RED P. (*P. Americana*), leaves ovate, coarsely or doubly serrate; common in the west especially, where it is cultivated much, other fruit of the kind not succeeding well on the prairies; its fruit varies greatly in color and size, is sometimes an inch in diameter and of pleasant flavor.—The CHICKASAW P. (*P. Chicasa*) has narrow, finely serrate leaves, and globular fruit; it is found from Md. to Ill. and s.w., and probably is not indigenous.—The BEACH P. (*P. maritima*) is a shrub; fruit globular, purple or crimson, with bloom; it grows on the coast from Me. to Va., and a variety further south. The other wild species of Prunus are called Cherries, which they resemble in bud folding, little or no bloom on fruit, and some in the globular stone. The old world Plums have bud-leaves convolute, and stone flattened and acute. The Common P., the Bullace, and the Sloe, have been reckoned by botanists as distinct species, though with much doubt if they are really distinct, as the P. passes into the Bullace, and the Bullace into the Sloe by insensible gradations; though there is so wide a difference in general appearance, size of leaves, and size as well as quality of fruit, between the best cultivated plums and the sloe, that it is difficult to consider them as springing from a common stock. The COMMON P. (*P. domestica*) appears in a wild state in woods and hedges in many parts of England and on the continent of Europe, and in road sides and waste places from New England to Penn., probably, however, often derived from the seeds of cultivated trees. It is commonly described as destitute of spines, and as further differing from the bullace in having the under-side of the leaves smooth, except when very young; but if these characters are adopted, many of the cultivated plums must be referred to the bullace (*P. insititia*) as their original; nor does the ovate fruit afford a more certain character, some of the finest garden plums being globose or nearly so, like the bullace. The varieties called Damson (q.v.) are particularly like the bullace, except in the form of the fruit. Cultivated plums vary greatly in the size, form, color, and flavor of the fruit. The fruit of some varieties, e.g., the *White Magnumbonum*, is two inches long; while damsons of the same shape are not quite one inch, and a single fruit of the one is equal to at least eight or ten of the other. The best varieties of P. are delicious dessert fruits; among these, the *Green Gage* (*Reine Claude* of the French) is one of the most esteemed; and is unsurpassed in sweetness and flavor. The inferior varieties are used in pies, conserves, and sweetmeats: some are very austere. In moderate quantity, plums are wholesome; but excess in the use of them is apt to produce colic, diarrhea, and cholera. The danger is greater if they are eaten before being perfectly ripe. A very pleasant wine is made from plums; and in parts of Europe a strong spirit is

distilled from them after fermentation; but for this purpose they are mixed in s. France with honey and flour, and in Hungary with apples.—The dried fruit, variously known as *Dried Plums*, or *French Plums*, and *Prunes*, is much used for dessert; and the somewhat austere fruit of the *St. Julien Plum*, cultivated in s. France, becomes, when dried, the medicinal prune, used as a mild laxative. See PRUNES.

The P. is grown over a wide area and in great diversity of soils and climates. Deep and rich clays and loams are more favorable than sandy soils, though some varieties are specially adapted to the latter. Choice kinds are largely propagated in this country by budding on imported stocks, though many nurserymen grow their own stocks from the seeds of the Horse P., or of some other strong growing variety. Propagation can be effected also by means of layers. The seedling plants are budded or whip-grafted when one or two years old, and placed in the nursery rows. Two years later the rapid-growing sorts will be large enough to set in the orchard, but some varieties require more time. Standard trees are to be set 12 to 20 ft. apart each way, according to the vigor of the variety planted, but dwarfs can be planted 8 to 10 ft. apart. Shallow cultivation, if not too late in the fall, is beneficial, and in the case of young trees is of great importance. The land should be kept in high fertility by use of well-rotted manures, or commercial fertilizers. While the trees are young, pruning will be required to keep the heads well rounded and prevent excessive growth of single shoots. A large part of this work can be done by pinching back the ends of the twigs and rubbing out superfluous buds. Fruit is produced on spurs from wood at least two years old, and these should remain productive for a long period. If the conditions are favorable and the trees are well cared for, fair crops of fruit should be obtained in five years from planting, and the trees should remain in bearing 50 years. In rich land P. trees often show tendency to overbear. When this occurs, the fruit should be thinned as soon as it is one-fourth in. in diameter. Though their differences are not sharply defined, our cultivated plums may be divided into three general classes: the yellow or green, the purple, and the red. Among the best varieties in the first class are the Green Gage (of which there are numerous worthless imitations), and the Imperial Gage; in the second class, the Lombard, and the Bradshaw; in the third class, Pond's Seedling and Victoria (Sharp's Emperor). The quality is greatly improved by allowing the fruit to ripen fully on the tree, but this cannot be permitted when distant markets are to be supplied. As the fruit ripens unevenly, it will be necessary, in order to secure the crop in the best condition, to go over the trees several times.—The principal enemy of the P. is the curculio, or P. weevil (see WEEVIL) (*Conotrachelus nenuphar*), which attacks also the peach, cherry, and other fruit. It commences its depredations when the fruit is not larger than a pea. The full-grown insect feeds on the fruit and leaves

but does its principal injury by puncturing the fruit and laying its eggs in the cavities thus formed. The egg hatches in about five days, and the larva eats the interior of the fruit, thus causing it to fall. The larva then enters the ground, where it undergoes transformation and becomes a perfect insect. In many places the ravages of this pest have been so great as to cause the general abandonment of P. culture. Of the large number of remedies which have been proposed, probably the most efficient is the jarring of the trees every morning, and catching, on sheets spread underneath, the beetles and defective fruit which are shaken down, and which are then to be destroyed. This treatment must be commenced as soon as the fruit is formed, and be continued three or four weeks. In recent years spraying with arsenical mixtures has been tried with some success. By destroying the infected specimens which fall to the ground, poultry or swine kept under the trees will greatly reduce the evil which would otherwise be caused.

The chief disease to which the P. is subject is the black knot. It is probably of a fungoid nature, and it proves terribly destructive. The only remedy which will be of the slightest avail is the cutting out of every particle of the diseased wood. This should be done as soon as the disease appears, and the wound should be washed with a chloride of lime solution, and afterward covered with grafting-wax. The diseased wood should be burned, and no grafts or buds for propagation should be taken from a tree in which the disease has appeared. Good cultivation, and the use of manures containing phosphoric acid and potash, with a fair supply of nitrogen, will tend to keep the trees in vigorous condition, and to prevent this disease.—The wood of the P.-tree is hard and fine-grained, and is used in cabinet-work, in turnery, and for musical instruments.—The CASHMERE P. (*P. Bokharensis*), cultivated in Cashmere and Bokhara, is regarded as a distinct species.—The CHERRY P., or MYROBALAN P. (*P. cerasifera*, or *Myrobalanus*), is a bush very similar to the sloe, with pendulous globular red fruit. It is a native of N. America, but is often cultivated in Europe.

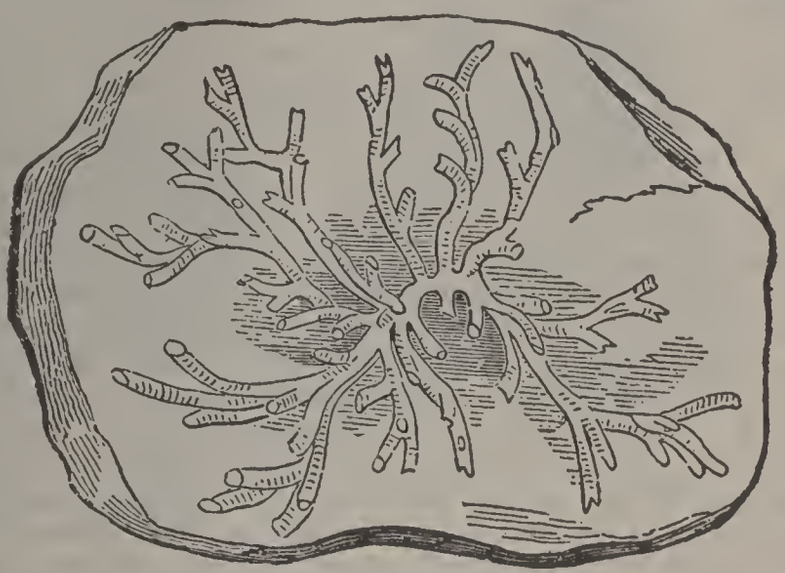
The COCOA P. or ICACO of the W. Indies is the fruit of *Chrysobalanus icaco*, a tree of nat. order *Rosaceæ*, sub-order *Chrysobalaneæ*. The fruit resembles a P., has a sweet though slightly austere taste, and is eaten both raw and preserved.—The fruit of *Parinarium excelsum*, another of the *Chrysobalaneæ*, is called Gray Plum at Sierra Leone.

PLUM, DATE: see DATE PLUM.

PLUMAGE, n. *plôm'āj* [F *plume*, a feather: L. *pluma*, a small soft feather: W. *pluf*, feathers: Ger. *pflaum*, down]: the feathers that cover a bird: see BIRDS: FEATHERS.

PLUMASARY, n. *plô-măs'a-rĭ* [F. *plumasserie*]: plume or collection of ornamental feathers. PLUMAS'SIER, n. *-ĭ-ér*, [F.]: one who prepares or deals in plumes or feathers for ornamental purposes.

PLUMATELLA, *plō-ma-tĕl'a:* genus of moss-animals (*Polyzoa*), having the polyzoarium fixed, membranaceous, and branched; the polypides exserted from the extremities



Plumatella Repens.
(From Johnston's *British Zoophytes.*)

of the branches with a crescent-shaped disk surrounded by a single series of many tentacles. The species are found attached to stones, etc. *P. repens* sometimes spreads over a sq. foot, with branches three inches long, which adhere to some surface throughout almost their whole length. The tentacles are beautifully feathered with cilia on two opposite sides.

PLUMB, n. *plŭm* [F. *plomb*—from L. *plumbum*, lead: It. and Sp. *plumbeo*, leaden]: a mass of lead attached to a line, and so hung as to ascertain whether a wall be perpendicular; also called PLUMB-LINE: ADJ. perpendicular; downright: AD. perpendicularly; heavily: V. to adjust to the perpendicular by a plumb-line; to search the depth of by a line with a weight at its end; to sound. PLUMB'ING, imp.: N. the art of working in lead, and using it in buildings, especially in providing and arranging pipes and all other fixtures for supply of water, gas, etc. (see SANITARY ENGINEERING). PLUMBED, pp. *plŭmd.* PLUMBER, n. *plŭm'ĕr*, a worker in lead. PLUMB-LINE, a line or cord having a piece of lead at one end, suspended from a frame or narrow board; a line perpendicular to the plane of the horizon. PLUMB-RULE, a simple instrument, same as a *plumb-line*, used by masons, bricklayers, and carpenters. PLUM'BEAN, a. *-bē-ăn*, or PLUM'BEOUS, a. *-bē-ŭs* [L. *plumbĕŭs*, leaden]: consisting of or resembling lead; leaden; dull; stupid. PLUMB'ERY, n. *-ĕr-ĭ*, a place where sheet or mill lead is manufactured into the various articles of a plumber's trade. PLUM'BIC, a. *-bĭk*, pertaining to or containing lead. PLUMBISM, n. *plŭm'bĭzm*, the condition of an individual whose system has been brought under the influence of lead poison, as plumbers and painters. PLUMBIC ACID, the peroxide of lead. PLUMBIFEROUS, a. *plŭm-bĭf'-ĕr-ŭs* [L. *plumbum*, lead, and *fero*, I produce]: producing or containing lead.

PLUMBAGINEÆ, *plŭm-ba-jĭn′ē-ē,* or PLUMBAGINACEÆ, *plŭm-băj-ĭ-nā′sē-ē:* natural order of exogenous plants, herbaceous or half-shrubby; with leaves somewhat sheathing at the base, and often clustered; flowers in panicles or in heads; calyx tubular, persistent, plaited; corolla very thin, of one or five petals; stamens five; ovary superior, 1-celled, with a solitary ovule; styles generally five; fruit a Utricle (q.v.). There are about 160 known species, found chiefly on the sea-shores and in the salt marshes of temperate regions. Some are found in elevated regions, in all zones. Many have flowers of great beauty, and are favorites in gardens. Some are occasionally used in medicine as tonics and astringents; others, being exceedingly acrid, as vesicants, particularly species of *Plumbago.* Marsh Rosemary (q.v.), otherwise called Sea Lavender, has long clawed petals; a variety of it (*Caroliniana*) grows on the coasts of the northern states, and has a hollow scape and more erect branches. Thrift, or Sea-pink (q.v.), is another example of the order. PLUMBAGIN, or PLUMBAGINE, n. *plŭm-bā′jĭn* [L. *plumbāgo,* the leadwort]: a substance extracted from the roots of the plant leadwort.

PLUMBAGO, n. *plŭm-bā′gō* [L. *plumbāgo,* black lead—from *plumbum,* lead]: one of the names given to *graphite,* or *black lead,* from its resemblance to an ore of lead—used for making pencils, etc.; a form of carbon (see BLACK LEAD). PLUMBAG′INOUS, a. *-băj′ĭ-nŭs,* resembling or containing plumbago, or consisting of it.

PLUMBO-, prefix, *plŭm-bō-* [L. *plumbum,* lead]: connected with, or derived from, lead.

PLUME, n. *plōm* [F. *plume,* a feather—from L. *pluma,* a small soft feather (see also PLUMAGE)]: the feather of a bird, particularly a large one; a bunch of feathers for a decorative purpose; a crest; in *OE.,* a token of honor: V. to pick and adjust feathers; to strip of feathers; to adorn with feathers or plumes; to pride; to boast, as *to plume one's self.* PLUM′ING, imp. PLUMED, pp. *plōmd:* ADJ. adjusted or arranged, as feathers; adorned with feathers; stripped of feathers. PLUMY, a. *plōm′ĭ,* feathery; feathered. PLUME′LESS, a. without plumes or feathers. PLUMELET, n. *plōm′lĕt,* a little plume. PLUMIGEROUS, a. *plōm-ĭj′er-ŭs* [L. *gero,* I carry]: feathered; plumed. PLUMIL′IFORM, a. *-ĭl′ĭ-fawrm* [L. *forma,* a shape]: having the shape of a plume or feather. PLUMIPED, a. *plōm′ĭ-pĕd* [L. *pes,* or *pedem,* a foot]: having feathered feet. PLUMOSE′ a. *-ōs′,* or PLUM′OUS, a. *-ŭs* [L. *plumōsus*]: in *bot.,* applied to hairs or plants that have branches arranged like the beard on a feather; feathery. PLUMOSITY, n. *plōm-ŏs′ĭ-tĭ,* the state of being plumose.

PLUME-BIRD, *plôm'bĕrd* (*Epimachus*): genus of birds of family *Upupidæ* (see HOOPOE), but exhibiting points of

Plume-bird (*Epimachus albus*).

resemblance both to honey-suckers and to birds-of-paradise. The bill is slender and arched. The plumage is gorgeous, scarcely excelled even by that of birds-of-paradise. The birds are natives of New Guinea and New Holland. They are variously adorned with enormously long tail-feathers, great shoulder-tufts of broad feathers, loose downy plumes, etc. *E. albus* has remarkable thread-like prolongations of the shaft of some of its plumes.

PLUMED MOTH: popular name of a group of '*Nocturnal Lepidoptera*,' known to entomologists as *Fissipennæ* and *Pterophorites;* remarkable for having at least a pair of the wings, and often all the wings, longitudinally cleft into two or more—sometimes six—divisions, beautifully fringed at the edges. The wings are similar to those of other moths in their nervures, but the membrane which usually

Plumed Moth.

connects the nervures is interrupted. The Plumed Moths are extremely beautiful, but often pass unobserved in consequence of their small size. Some have the power of folding up the wing like a fan. Although they are ranked among *Nocturnal Lepidoptera*, some of them fly about during the brightest part of the day.

PLUMER, *plŭm'ėr*, WILLIAM: 1759, June 25—1850, June 22; b. Newburyport, Mass. At the age of 8 years he moved with his parents to Epping, N. H. After an academic education, he was admitted to the bar 1787. He was elected repeatedly to both branches of the state legislature; was a member of the constitutional convention 1792; U. S. senator 1802–07; gov. of N. H. 1812–16 and 1817–8; presidential elector 1820, when he refused to vote for Monroe on account of the latter's financial embarrassments. Thereafter he took no part in public life, though he was a frequent contributor to the periodical press under the signature 'Cincinnatus.' He left valuable biographical and historical writings unpublished.

PLUM'ER, WILLIAM SWAN, D.D., LL.D.: Presbyterian theologian: 1802, July 25—1880, Oct. 22; b. Darlington, Penn. He graduated from Washington Coll., Va., 1825; after studying theol. a year at Princeton, was ordained 1827, and organized a Presb. church in Danville, Va.; and later at Warrenton, N. C.; subsequently had pastorates in other places in the same states, including Petersburg and Richmond, Va. (1st Presb. Chh.); also Baltimore, Md. (Franklin St. Chh. 1847–54); Allegheny, Penn. (where his work was supplemented by that of prof. of theol. in Western Theol. Seminary); in Philadelphia (Arch St. Presb. Chh. 1862–65); and in Pottsville, Penn. In 1866 he became prof. of theol. in the seminary at Columbia, S. C., occupying different depts. of the same till near his death at Baltimore. He founded the paper *Watchman of the South* 1837, and was for many years its editor. He was active in establishing an asylum for the deaf and dumb at Staunton, Va. Dr. P. presided over the Presb. general assembly 1838, and over the southern assembly 1871. His personal appearance and his manner in the pulpit were peculiarly impressive. Among his publications were an *Argument against the Indiscriminate Incorporation of Churches and Religious Societies* (1847); *The Bible True and Infidelity Wicked* (1848); several practical religious books, for children and others: *Rome against the Bible and the Bible against Rome* (1854); *Christ our Theme and Glory* (1855); *The Church and her Enemies* (1856); a work on the Ten Commandments (1864); *Jehovah Jireh* (1866); *Studies in the Book of Psalms* (1866); *The Rock of our Salvation* (1867); *Words of Truth and Love* (1868); commentaries on the Epistles to the Romans and to the Hebrews; and many occasional discourses.

PLUMMER, *plŭm'ėr*, and PLUM'MERY, *-ėr-ĭ*, less correct spellings of PLUMBER and PLUMBERY: see PLUMB. PLUMMER-BLOCK, the part of the spring-beam of the paddle-box of a steamship in which the end of the shaft is received.

PLUMMET, n. *plŭm'mĕt* [see under PLUMB: Sp. *plomada*, a plummet: mid. L. *plumbatum*—from L. *plumbum*, lead]. a long piece of lead attached to a line, used in sounding the depth of water; the line or instrument itself. PLUM'MING, n. in *mining*, the operation of searching to find a proper place for an air-shaft. PLUMMET, or PLUMMET-LINE, a piece of lead at the end of a line, generally suspended from a board or frame, used by carpenters and masons to show the vertical line for testing their erections.

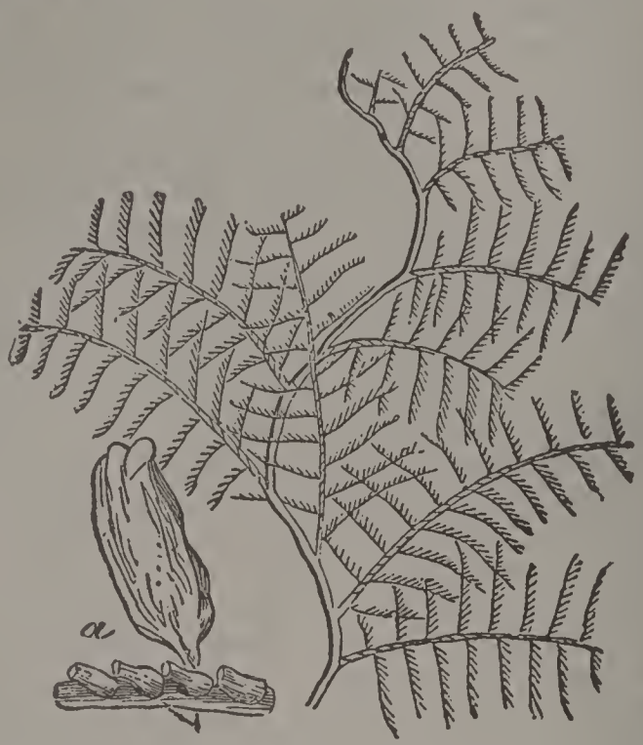
PLUMP, a. *plŭmp* [Bav. *plumpf*, the noise made by something falling flat with a dull sound: Sw. *plumpa*, to plump or plunge: Ger. *plump*, massive, plumpish]: full with substance; round and sleek, with fulness of flesh; round; blunt or downright; unqualified, as a lie: V. to make plump; to swell out; to fatten; to dilate; to let fall suddenly and heavily; to fall suddenly or at once, like a mass of dead matter; to give undivided or in a lump, as a vote to *one* only, where a vote to each of *two* or more could be given: AD. with a sudden fall. PLUMP'ING, imp. PLUMPED, pp. *plŭmpt*. PLUMP'ER, n. *-ẽr*, that which may swell out something else; a vote given to *one* only when *two* or more candidates are to be elected. PLUMP'LY, ad. *-lĭ*, fully; without reserve; bluntly. PLUMP'NESS, n. *-nĕs*, fulness of skin; distension to roundness. PLUMPY, a. *plŭmp'ĭ*, fat; jolly. TO TELL A THING PLUMP, to blurt it out without circumlocution.

PLUMPTRE, *plŭm'trĭ*, EDWARD HAYES, D.D.: 1821, Aug. 6—1891, Feb. 1; b. London: Anglican clergyman and author. He graduated at Oxford Univ. 1844, and became a fellow of Brasenose Coll.; appointed chaplain of King's Coll., London, 1847, and prof. of pastoral theol. there 1853; became prebendary of St. Paul's, London, 1863, and prof. of N. Test. exegesis 1864. He was appointed rector of Pluckley, Kent, 1869; and vicar of Bickley 1873. He was a member of the O. Test. commission for revising the authorized version of the Bible. He became dean of Wells 1881. He has written many books and contributed largely to periodical literature. He is author of translations of *Sophocles*, *Æschylus*, and Dante's *Divina Commedia; Respice, Aspice, Prospice* (an essay on the law of progress in theology); *Christ and Christendom; Lazarus, and Other Poems; St. Paul in Asia Minor;* commentaries on several books of the Bible, etc.

PLUM-PUDDING: see under PLUM.

PLUMULARIA, *plô-mū-lā'rĭ-a:* genus of hydroid polyps, type of the family *Plumulariidæ;* plant-like, rooted, simple, or branched: with feathery shoots and offsets; and having hydra-like polyps in small cells arranged on one side of the shoot or branch, usually in the axil of a horny spine. The species are numerous, inhabitants of the sea, attached to stones, shells, sea-weeds, etc. They are very beautiful objects, even as seen by the naked eye, still more when examined by the microscope; combining delicacy with elegance. The polyps in a single P. are often exceedingly numerous; those of *P. falcata*, often found at

low-water mark, have been calculated as 80,000 or 100,000 in number.



Plumularia Falcata (natural size):
a, the ovarian vesicle and four of the polyp-cells of P. falcata, magnified. (From Johnston's *British Zoophytes.*)

PLUMULE, n. *plō'mūl*, or PLU'MULA, n. *-mū-lă* [L *plum'ula*, a little feather—from *pluma*, a feather]: in *bot.*, that point of the embryo of a seed which develops in a direction contrary to the radicle, being the first bud or gemmule of the young plant: see SEED.

PLUMY: see under PLUME.

PLUNDER, n. *plŭn'dėr* [Low Ger. *plunden*, rags: Ger. *plunder*, things of little value; *plündern*, to pillage: Dut. *plunderen*, to seize on the goods of another by force]: spoils of war; booty; the produce of robbery or fraud: V. to take by open force, as the goods of an enemy; to spoil; to pillage; to rob. PLUN'DERING, imp. PLUN'DERED, pp. *-dėrd.* PLUN'DERER, n. *-dėr-ėr*, one who plunders; a robber. PLUN'DERAGE, n. *-āj*, the embezzlement of goods on board a ship.—SYN. of 'plunder, v.': to spoil; sack; rifle spoliate; pillage: despoil; rob: strip.

PLUNGE, v. *plŭnj* [F. *plonger;* Dut. *plotsen*, or *plonzen*, to fall into the water: Swiss, *bluntschen*, the sound of a thick heavy body falling into the water]: to thrust into water or other fluid substance; to thrust into any substance that is penetrable; to pitch or throw one's self headlong into water; to dive; to fall or rush into any distress, or into any state or circumstances in which the person is surrounded or inclosed, as into sorrow, difficulty, darkness; among *quadrupeds*, to throw the body forward and the hind legs up, as a horse: N. the act of thrusting or pitching into water; the act of throwing one's self headlong, as an unruly horse. PLUNG'ING, imp.: ADJ. diving; rushing headlong: N. the act of rushing or putting into water.

etc.; the attempt of an unruly horse to throw his rider. PLUNGED, pp. *plŭnjd.* PLUNG'ER, n. *-ėr,* one who plunges; a solid brass cylinder used as a forcer in a forcing pump. PLUNGEON, n. *plŭn'jŏn,* a sea-fowl; the diver. PLUNGE BATH, a large bath in which persons can put themselves wholly under water. PLUNGE-POLE, the pump rod of a pumping-engine.

PLUPERFECT, a. *plö-pėr-fĕkt* [L. *plus,* more; *perfectus, perfect,* complete]: in *gram.,* the tense of a verb with the sign *had,* signifying that a certain action or event occurred before some other action or event, as 'I had loved.'

PLURAL, a. n. *plö'răl* [L. *plurālis,* plural—from *plus,* more; It. *plurale;* F. *pluriel;* OF. *plurel,* plural]: consisting of more than one; expressing two or more. PLU'RALLY, ad. *lĭ.* PLURALITY, n. *plô-răl'ĭ-tĭ,* state of being or having a greater number; a number consisting of more than one of the same kind; a majority over others, as of votes; more than one benefice held by the same clergyman. PLURALIST, n. *plô-răl-ĭst,* a clergyman who holds more than one benefice. PLURALIZE, v. *īz.* PLU'RALIZING, imp. PLU'RALIZED, pp. *-īzd.*

PLURALISM: a philosophical theory opposed to monism (q.v.) and holding that ultimate reality is made up of a number of real beings. These ultimate and independent reals are in some systems thought of as material atoms (see MATERIALISM); or they may be conceived as animate as in hylozoism (q.v.), or finally as spiritual, as generally in idealism and explicitly in Leibniz (q.v.). The problem upon which philosophers divide into monists and pluralists, the problem of the one and the many as is historically known, is one of the most fundamental in all the range of philosophical speculation. In modern thought it gains its major interest in connection with the question as to whether human individuals are in reality independent persons creating new results each in his own way, or are merely parts of an over-ruling Absolute in whom all events have been once and for all predetermined. James's *Will to Believe* and Howison's *Limits of Evolution* contain excellent expressions of the pluralistic attitude toward this issue.

PLURI, *plô'rĭ* [L. *plus,* more, *plūris* or more]: the first element of a compound, signifying 'several.'

PLURILITERAL, a. *plô'rĭ-lĭt'ėr-ăl* [L. *plus,* more, *plūris,* of more; *litĕra,* a letter]: containing more than three letters.

PLURILOCULAR, a. *plö'rĭ-lŏk'ū-lėr* [L. *plus,* or *plūrem,* more; *loculus,* a little place—from *locus,* a place]: in *bot.,* having several divisions containing seeds.

PLURIPARTITE, a. *plö'rĭ-pâr'tīt* [L. *plus,* or *plūrem,* more; *partītus,* parted or divided—from *pars,* a part]: in *bot.,* applied to an organ which is deeply divided into several nearly distinct portions.

PLUS, ad. *plŭs* [L. *plus*, more]: more: N. in *alg.*, or *arith.*, the sign (+) set between numbers or quantities, signifying that they are to be added together.

PLUSH, n. *plŭsh* [F. *peluche*—from It. *peluccio*, plush; *peluzzo*, fine hair—from L. *pilus*, hair: Piedm. *plucia;* Ger. *plüsch;* Dut. *pluis*, a lock or tuft of hair, plush]: woven cloth, having a long shaggy pile on the upper surface. Although woven like velvet, it differs from it in the greater length of the pile, and in its not being clipped or shorn to a uniform length. Formerly, it was made of a double warp, one thread being usually double worsted yarn, the other, intended to form the pile, of goat's hair, and the weft of worsted; occasionally, only worsted was used. Now, it is made extensively of silk and cotton, the silk taking the place of the goat's hair to form the pile. This silk plush is the material now almost universal for gentlemen's hats, instead of beaver-hair as formerly: it is worked also in colored silks, for many articles of ladies' attire: see WEAVING.

PLUTARCH, *plū'târk* (*Ploutarchos*): biographer and moralist: born at Chæroneia in Bœotia. He was contemporary of the Plinys and Tacitus, but we can only approximate to the year of his birth. He tells us that he was a student of philosophy at Delphi, under Ammonius, when Nero was making his progress through Greece A.D. 66; and we may infer that in that year he was beyond the age of puberty. He lived some years in Rome, and in other towns of Italy, where he seems to have been much occupied with public business, and with giving lessons in philosophy—to which he attributes his having failed to learn the Latin language in Italy, and his having to postpone his studies in Roman literature till late in life. During the reign of Domitian, he was delivering lectures on philosophy at Rome; but we have not sufficient evidence for the statement that he was preceptor to Trajan, or that that emperor raised him to consular rank. The later years of his life he spent at Chæroneia, where he discharged the duties of archon and priest of Apollo. He lived till 106, eighth year of the reign of Trajan; but how much longer is not known, though there is some probability that he outlived Trajan, who d. 117. He was married to an amiable wife, Timoxena, by whom he had several sons, who reached manhood, and left descendants.

The work by which P. is best known is his *Parallel Lives* of 46 Greeks and Romans. These are arranged in pairs, each pair forming one book (*biblion*), consisting of the life of a Greek and a Roman, and followed by a comparison between the two men: in a few cases, the comparison is omitted or lost. The heroes of these biographies are the following: 1. Theseus and Romulus; 2. Lycurgus and Numa; 3. Solon and Valerius Publicola; 4. Themistocles and Camillus; 5. Pericles and Q. Fabius Maximus; 6. Alcibiades and Coriolanus; 7. Timoleon and Æmilius Paulus; 8. Pelopidas and Marcellus; 9. Aristides and Cato the Elder; 10. Philopœmen and Flamininus; 11. Pyrrhus and Marius; 12. Lysander and Sulla; 13. Cimon and Lu-

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cullus; 14. Nicias and Crassus; 15. Eumenes and Sertorius; 16. Agesilaus and Pompeius; 17. Alexander and Cæsar; 18. Phocion and Cato the Younger; 19. Agis and Cleomenes, and Tiberius and Caius Gracchus; 20. Demosthenes and Cicero; 21. Demetrius Poliorcetes and M. Antonius; 22. Dion and M. Junius Brutus. In addition, are placed in the editions after the 46th *Parallel Lives,* the biographies of Artaxerxes Mnemon, Aratus, Galba, and Otho. P. has no equal in ancient, and few in modern times, as a writer of 'Lives.' His power lies in his felicitous grasp of the character as a whole, and his skill in keeping minor details in subordination. It is not till the reader has seen the portrait in its completeness that his attention is attracted to accessory points. 'There are biographers (says an admirable writer in the *Quarterly Review*) who deal with the hero, and biographers who deal with the man. But Plutarch is the representative of ideal biography, for he delineates both in one.' Yet with all their artistic harmony, his lives abound with anecdotes and *bon-mots* in such profusion, that they form one of our chief authorities for the table-talk of the Greeks and Romans. Their popularity in ancient, mediæval, and modern times, with readers of every rank and age, is extraordinary; and they have exerted a very powerful and salutary influence on the art of biography. The other writings of P., more than 60 in number, are included under the general title *Moralia,* or Ethical Works. Several ofthese are not purely ethical in their tenor; while many of them are probably not by him, or if they are, do him small credit. Even in the best of the *Moralia* there is no philosophical system; their merits are not speculative, but practical; and their value consists mainly in their good sense, in the justness of their views on the ordinary affairs of human life; and in the benevolence of tone diffused throughout them. The best text of the Lives is that of Immanuel Bekker; the best translation in English is that of Dryden and others, as re-edited by Clough. The best ed. of the *Moralia* is by Wyttenbach (Oxford 1795–1800); and of the entire works, the editions of Reiske (Leip. 1774–82) and Hutten (Tüb. 1791–1805).

PLUTEUS, n. *plō′tē-ŭs* [L. *plutĕŭs,* a breastwork or parapet on towers, etc.—perhaps from *pluit,* it rains—*lit.,* something that protects against rain]: in *anc. arch.,* wall sometimes built to close the intervals between the columns of a building; also the space between two orders placed one over the other as in the amphitheatres, etc. In *milit.,* P. was a movable gallery shaped like an arched wagon, used by besiegers for protection of their archers. In *zool.,* the larval form of the Echinoidea.

PLUTO, n. *plō′tō* [L. *Pluto:* Gr. *Ploutōn*]: in the *anc. myth.* of the Greeks and Latins, the god of the lower world, husband of Proserpine, and brother of Jupiter and Neptune. PLUTONIAN, a. *plō-tō′nĭ-ăn,* of or relating to Pluto, or to the regions of fire; dark. PLU′TONIST, n. *-tŏn-ĭst,* one who refers the formation of rocks and the earth's crust to the action of fire. PLU′TONISM, n. *-ĭzm,* the doctrine or theory which refers the rock-formation of the earth's crust

to the action of fire, rather than water; opposite of *Neptunism*. PLUTONIC, a. *plô-tŏn'ĭk*, in *geol.*, applied to igneous rocks found at some depth in the earth, as distinct from *volcanic*, which are consolidated on the surface—the plutonic being more crystalline and exhibiting more structure than the volcanic, as in granites. *Plutonic rocks* was the name given by Lyell to the Granitic Rocks, on the supposition that they were formed at considerable depth in the earth, and were cooled and crystallized slowly under great pressure. They were so designated in distinction from the Volcanic Rocks, which, though they have risen up from below, cooled from a melted state more rapidly upon or near the surface, as it was supposed. It is now proven, however, that the granites, while sometimes forced up into fissures in a plastic state, are in general sedimentary rocks that have been metamorphosed *in loco* by two conditions, moisture and some degree of heat, not necessarily great if slowly acting through a long period. See GRANITE.

PLU'TO [Gr. *Ploutōn*, from *plouteō*, I am rich]: originally only a surname of HADES, as the giver or possessor of riches: in the mythology of Greece, the third son of Kronos and Rhea, and brother of Zeus and Poseidon. On the tripartite division of the universe, he obtained the sovereignty of the under-world—the realm of darkness and ghostly shades, where he sits enthroned as a 'subterranean Zeus'—to use the expression of Homer, and rules the spirits of the dead. His dwelling-place, however, is not far from the surface of the earth. P. is inexorable in disposition, not to be moved by either prayers or flatteries. He is borne on a car, drawn by four black steeds, which he guides with golden reins. His helmet makes him invisible, whence, according to some scholars, his name of *Hades* [from *a*, priv., and *idein*, to see]; though others, with at least equal probability, derive Hades from *hadō*, or *chadō*, I receive or embrace, and translate the word the 'all-receiver.' In Homer, Hades never means a place, but always a person. Moreover, it is to be noticed that the poet does not divide the realm of the shades into two separate regions. All the souls of the dead—good and bad alike—mingle together. Subsequently, however, when the ethical conception of future retribution became more widely developed, the kingdom of the dead was divided into Elysium (q.v.), the abode of the good, and Tartarus (q.v.), the place of the wicked. This change also exercised an important influence on the conception of Pluto. The ruler of the under-world not only acquired additional power and majesty, but the very idea of his character was essentially modified. He came to be regarded as a beneficent deity, who held the keys of the earth in his hand, and possessed its metallic treasures (whence his new name *Pluto*, or *Plutus*), and who blessed the year with fruits; for out of the darkness underground come all the riches and swelling fulness of the soil. Hence, in later times, mortals prayed to him before proceeding to dig for the wealth hidden in the bowels of the earth.

P. married Persephone (Proserpina), daughter of Deme-

ter (Ceres), after carrying her off from the plains of Enna. He assisted his brothers—according to the mythological story—in their war against the Titans, and received from the Cyclops, as a reward for delivering them from Tartarus, the helmet that makes him invisible, which he lent to Hermes (Mercury) in the aforesaid war, to Perseus in his combat with the Gorgons, and which ultimately came to Meriones. The Erinnyes and Charon obey his behests. He sits in judgment on every open and secret act, and is assisted by three subordinate judges, Æacus, Minos, and Rhadamanthus. The worship of P. was widely spread among both the Greeks and the Romans. Temples were erected to his honor at Athens, Elis, and Olympia. Among trees and flowers, the cypress, boxwood, narcissus, and maidenhair were sacred to him; bulls and goats were sacrificed to him amid the shadows of night, and his priests had their brows garlanded with cypress-wreaths. In works of art, he resembles his brothers Zeus and Poseidon; only his hair hangs down somewhat wildly and fiercely over his brow. and his appearance, though majestic, as becomes so mighty a god, has something gloomy and terrible. There can be little doubt that he, as well as Pan (q.v.), helped to trick out the conception of the devil prevalent during the middle ages, and not yet extinct. If it was from Pan that the devil derived those physical characteristics alluded to in the famous *Address to the Deil* by the poet Burns:

> 'O thou, whatever title suit thee,
> Auld *Hornie*, Satan, Nick, or *Clootie*,'

it may be also that to P. he owes his position as 'king of Hell,' 'his Blackness,' and many of the insignia of his infernal royalty.

PLUTOCRACY, n. *plô-tŏk'ra-sĭ* [Gr. *ploutos*, riches; *kratia*, rule]: govt. by the rich; a class powerful in the state because of its wealth. PLUTOCRAT, n. *plô'tō-krăt*, one having power in the state because of his wealth. PLU'TOCRAT'IC, a. having the character of a plutocrat, or a plutocracy.

PLUTUS, n. *plô'tŭs* [L. *Plutus;* Gr. *Ploutos*, the god of riches]: in *anc. myth.*, the god of wealth; thence figuratively riches; wealth. P was fabled to be son of Ceres and Iasius: he was represented as blind, and as bestowing his gift on the good and the bad indiscriminately. The caves of Spain, famous for their deposits of precious metals, were assigned as his abode.

PLUVIAL, a. *plô'vĭ-ăl*, or PLU'VIOUS, a. *-ŭs* [F. *pluvial;* L. *pluvĭālis*, of or belonging to rain; *pluvius*, rainy—from *pluvĭă*, rain: It. *pluviale*, *piovoso*]: of or belonging to rain; rainy; in *geol.*, applied to operations and results that arise from or depend on the action of rain.

PLUVIAMETER, n. *plô'vĭ-ăm'ĕ-tĕr* [L. *pluvĭa*, rain; Gr. *metron*, a measure]: an instrument for receiving and measuring the amount of rain that falls in any locality; a rain-gauge. PLU'VIAMET'RICAL, a. *-ă-mĕt'rĭ-kăl*, pertaining to a rain-gauge. PLU'VIAMET'RICALLY, ad. *-lĭ*. PLU'VIAM'ETRY, n. *-ăm'ĕ-trĭ*, the art of measuring the rainfall. The preceding are also spelt with *o* before *m*, as *pluviometer*.

PLUVIOMETER, PLUVIOMETRICAL, etc.: see PLUVIAMETER.

PLUVIOSE, n. *plō'vĭ-ōs* [F. rainy—from L. *pluviosus*—from *pluvia*, rain]: second winter month in the French republican year: see CALENDAR.

PLY, v. *plī* [F. *plier*, to fold or bend: Ger. *flechten*, to twist: Sp. *plegar*, to plait: L. *plicārĕ*, to fold: Gr. *plekō*, I twist]: to give one's mind to; to lay on with force; to apply closely and steadily to; to work at; to work; to offer service; to solicit earnestly; to practice or perform with diligence; to run regularly between two ports, as a vessel —also said of cabs running for hire: N. a fold; a plait. PLY'ING, imp.: N. urgent solicitation; effort or endeavor to make way against the wind. PLIED, pp. *plīd*. PLIER, n. *plī'ĕr*, one who plies. PLY'ERS, n. plu. *-ĕrz*, in *mech.*, a kind of balance used in raising or letting down a drawbridge—another spelling of PLIERS. TO PLY A TRADE, to exercise or follow a trade. TO PLY ONE'S HEELS, to exercise one's heels in running away. TO PLY ONE WITH FLATTERY, to keep flattering him.

PLYMOUTH, *plĭm'ŭth:* town, cap. of P. co., s.e. Mass., port of fishery and commerce on a broad but shallow harbor, w. of Cape Cod Bay, with shelter formed by the P. and Duxbury beaches; 37 m. s.e. of Boston, 28 m. n.e. of New Bedford, 48 m. n. e. of Newport, R. I., 30 m. n.e, of Fall River, Mass. It was till 1691, Sep., the seat of a colonial State of P., larger than Rhode Island, founded 1620, Dec. 21, by the famous Pilgrim Fathers (q.v.). The town has a front of about 5 m. from n. to s. on the harbor. The ground built over is mostly elevated, presenting many choice residential sites, which have been improved to make a place of notable attraction for summer visitors. The area of P. extends back about 5 m., and n. to s. about 18 m., with a width s. of the harbor of 8 or 9 m. Chiltonville and S. P. are small centres of population and business s.w. of the harbor; and at Manomet and vicinity are hotels and residences for summer resort. Throughout the larger part of P., great numbers of ponds with very fine water and excellent fishing are found. The industries of P. are varied and substantial, including very large cordage works, woolen and cotton mills, iron works, foundry, large manufactories of rivets, tacks, wire nails and brads, patent joints for bedsteads, zinc and iron plate, cotton duck, etc., and shoe factories. The former large cod fisheries of P. have declined, but mackerel fishing is still carried on. Cranberry culture is extensive. In the woods is plentiful growth of the beautiful Mayflower. One of the lines of the Old Colony r. r. extends 37 m. from Boston to P., with one route direct, and a second following the coast by Hingham, Cohasset, Marshfield, and Duxbury. New r. r. lines are under way, one s. to the cape, and one w. to Middleboro, giving direct connection with New York. In summer steamers ply daily between Boston and P. A massive granite monument, designed 1853 (corner-stone laid 1859, pedestal 45 ft. high, completed 1877, with four figures of

heroic size on the buttresses of the pedestal, Law, Freedom, Education and Morality, and a colossal statue of Faith, 36 feet high), was dedicated, 1890, Aug. 1, with poem by a Rom. Cath. journalist, John Boyle O'Reilly, and oration by W. C. P. Breckenridge, of Ky. Its site is considerably n. of any historical spot, with a view to better display. Pilgrim Hall, built 1824, and thoroughly renovated recently, is an interesting museum of Pilgrim relics, portraits, memorial paintings and other art. The court-house preserves the original colony records. The famous Rock, a bowlder of syenitic granite, from which the water-edge of the harbor has receded considerably, has been inclosed (1867) under a canopy of granite, and the face of Coles hill adjoining it, where the forty martyrs of the first winter were buried, is kept as a memorial spot under charge of the Pilgrim Hall Soc. The burial hill, a little distance back from the shore, marked originally the rear of the settlement, where the square log meeting-house, which, with a flat ordnance platform for a roof, served also as a fort. The schools, high schools, and private schools of Plymouth are of the best type; there is an excellent weekly paper; and the churches of various denominations are well supported. There are water supply (owned and operated by the town), electric lighting, and an electric street railway. Pop. (1900) 9,592; (1910) 12,141.

PLYM'OUTH: borough in Plymouth twp., Luzerne co., Penn., in the Wyoming valley, on the e. bank of the Susquehanna river, and on the Lackawanna and Bloomsburg railroad. It is 20 m. s.w. of Scranton, and 4 m. below Wilkesbarre. It has a high school and an academy, several newspaper offices, churches, national and savings banks. It is in the great anthracite coal region of Pennsylvania, and its chief industries are the mining and exporting of coal; it also manufactures drills and other mining machinery and hosiery. The inhabitants are principally Irish, Welsh, and Germans, employed in the extensive coal-mines near. In 1885 Plymouth was visited by a scourge of typhoid fever. Pop. (1910) 16,996.

PLYM'OUTH: English seaport and market-town, and parliamentary and municipal borough in s.w. Devonshire, 246 m. w.s.w. of London. It stands in the bight of Plymouth Sound (q.v.), between the estuaries of the Plym and Tamar. W. of it is Stonehouse (q.v.), a township and coast-guard station; still further w. is Devonport (q.v.), the great naval and military station. The two former places, however, having become united by continuous lines of houses, have lost their individuality, and are (with Devonport, which is walled, fortified, and surrounded by a moat) now generally considered as one great town. Of this great centre of fashion, trade, and naval and military preparation, Plymouth proper, which covers an area of one square mile, may be called 'the city,' and Devonport the 'west-end'; while Stonehouse is an intermediate district, containing chiefly

factories, barracks, victualling yards, hospitals, and other institutions. P. proper extends from Mill Bay on the w. to the mouth of the Plym on the east. Its site is somewhat rugged and uneven; an eminence forming the suburbs runs along its n. side, and another eminence, partly occupied by the citadel, fronts the Sound. The chief buildings are the Royal Hotel, comprising an immense inn, assembly-rooms, a theatre, and the Athenæum; public library, containing in its Cottonian collection 300 sketches by the old Italian masters; Guildhall; St. Andrew's Church, whose tower dates from 1490 (restored in 1874–5); and Charles Church (1646–58), dedicated to 'St. Charles the Martyr.' There are also important educational establishments, some of which are endowed, and many charitable institutions. Mill Bay and Sutton Pool are two small inlets of the sound, in which lie all the merchant-vessels bound for P. proper. Between these inlets, and along the shore, is the eminence or high plateau, called the Hoe. From this ridge, whence first the approach of the Spanish Armada is said to have been descried, magnificent shore and sea views are obtained. Its e. end is occupied by the citadel, a fortress mounting 150 guns, which commands the entrance of the Cutwater (the lower estuary of the Plym), and of Sutton Pool. Mill Bay, on the w., is so deep that vessels of 3,000 tons can lie at the pier at low-water. Here are the important Great Western Docks, covering 14 acres, with depth of 22 ft. Near these docks, and connected with them by a tram-line, are the railway termini. In 1880 there entered the port 3,665 vessels, of 726,937 tons; cleared 2,943, of 639,455 tons. The commerce is considerable with the Cape of Good Hope, the W. Indies, and the Mediterranean; the coasting trade also is important, and the fisheries are productive. Pop. (1881) 77,401; (1891) 84,179; (1901) 107,509.

P., described by Leland as being, in the reign of Henry II., 'a mene thing, an inhabitation of fishars,' was called by the Saxons Tameorworth (town on the Tamar); after the Conquest it was called Sutton (South Town); and it was not till the reign of Henry VI. that it received the name of Plymouth (mouth of the Plym). During the 14th and 15th c. it was frequently attacked and set on fire by the French, and 1512 an act was passed for the strengthening of its defenses, which since then have greatly increased, until now all the shores of the Sound are well defended by cannon, and a cordon of inland forts has been constructed at immense cost, surrounding the Three Towns at a distance of two to three miles.

PLYMOUTH BRETHREN, or PLYMOUTHITES: religious sect, styling themselves simply BRETHREN, which sprang into existence about 1830–35 in Plymouth, Dublin, and other places in the British islands, and which has extended itself considerably in the British dominions and in parts of the continent of Europe, particularly among the Protestants of France, Switzerland, and Italy, and somewhat in the United States. PLYMOUTHISM, n. *-ĭsm*, the tenets of the P. B.—The *Plymouth Brethren* seem to have originated in a reaction against exclusive high church principles

tis maintained in the Church of England, with everything of a kindred nature in other churches, and against a dead formalism associated with 'unevangelical' doctrine. Many of the first members of the new religious communities formed in Plymouth and elsewhere were retired Anglo-Indian officers, men of unquestionable zeal and piety; and these communities began to appear almost simultaneously in a number of places. Their origin is, however, to be ascribed largely to the labors and influence of Mr. Darby, from whom the P. B. on the continent of Europe are generally called *Darbyites*. Mr. Darby was a barrister, moving in the highest circles of society; and under deeply religious impressions, became a clergyman of the Church of England, and lived for some time in a mud-hovel in the county Wicklow, Ireland, devoting himself to his work; but afterward left the Church of England from conscientious scruples, and became an evangelist unconnected with any church. In this character he labored both in England and on the continent of Europe, preaching in French, English, and German. He also gave utterance to his opinions in numerous pamphlets, and in a quarterly periodical called *The Christian Witness*, which was the 'organ' of the Plymouth Brethren. He continued for many years to visit the communities or meetings of Plymouth Brethren. His tenets, and those of the P. B. in general, are strictly Calvinistic: original sin and predestination, the efficacy of Christ's sacrifice, the merit of his obedience, the power of his intercession, the gracious operations of the Holy Spirit in regeneration and sanctification, are prominent points. Millenarian views also are generally entertained by the P. B.; and they usually practice the baptism of adult believers without regard to previous infant baptism. They acknowledge the sacrament of the Lord's Supper, and administer it to one another in their meetings, usually on every Sunday, or 'first day of the week;' in this as in everything else, refusing to acknowledge any special ministers. They utterly reject the rite of confirmation. Their most distinctive peculiarity, in contrast with other Calvinistic churches, is their complete rejection of ecclesiastical organization. They suppose the whole Christian body in the world to have declined from the simplicity of truth and duty, like Israel of old, and therefore to have been 'corporately rejected of God,' and believe the true church to consist of themselves and of other chosen ones in the various Christian churches. They refuse to recognize any form of church government, or any office of the ministry; they insist much on the equal right of every *male* member of the church to "prophesy' or preach; and in their meetings, after each hymn or prayer, there is usually a pause, that any one, moved by the Spirit, may undertake this office. They exclude persons known to have been guilty of gross sins from participation with them in the Lord's Supper, until proof is afforded of repentance. The P. B. reject every distinctive appellation but that of Christians; though a special denomination is found necessary to designate them; and, in fact,

no one not holding their views could remain associated with them. A great schism took place among them in consequence of doctrines preached at Plymouth and Bristol concerning the human nature of Christ, Mr. Darby vigorously opposing what he deemed a dangerous error, and he and his adherents utterly separating from the fellowship of those who maintained or even refused to condemn it. One of the most noted (if not notable) converts to the principles of the sect was the revivalist Guinness, who was baptized 1860 by another Plymouth brother, Lord Congleton.

On the continent of Europe the Plymouth Brethren have in many places given great trouble to the Prot. churches by their opposition to all ecclesiastical order or organization. See works by Mrs. Grattan Guinness (1861) and Dennett; and hostile criticisms by Carson (1870), Reid (1874), and Croskery (1879).

In the United States the Plymouth Brethren have 314 assemblies or organizations, and 6,661 members.

PLYMOUTH COMPANY, THE: in American history, a company formed in the 17th century, of Plymouth and Bristol merchants, and also called the North Virginia Company. It was incorporated in 1606, and obtained a charter from James I., with grant of land between Long Island and Passamaquoddy Bay. This company was the rival of the London Company. In May, 1607, two ships were despatched to America bearing a company of colonists commanded by George Popham. An abortive attempt at permanent settlement was made on the Kennebec River, but Popham died and the remaining colonists returned home. The company still continued to exist till its reorganization in 1620 as the New England Company, or Council for New England.

PLYMOUTH ROCK. See MAYFLOWER, THE; PLYMOUTH, Mass.

PLYMOUTH SOUND: well-known roadstead off the S.W. coast of Devonshire; important as a naval station, and with considerable claims to be called, as it frequently has been, the most beautiful estuary on the English coast. Its position at the entrance of the English Channel is much in its favor. It is two and a half m. wide, and extends inland three m., penetrating into the country by means of the harbors of Hamoaze and Catwater, the estuaries of the Tamar and Plym respectively. On its W. side is Cawsand Bay. The shores, which present many beautiful views, rise in hills 100 to 400 ft., and are dotted with woods and with villages, and bound by coasts mostly rocky and abrupt. Mount Edgecombe Park, the beautiful seat of the Earl of Mount Edgecombe, occupies the W. shore. At the mouth of the Tamar is the small island of St. Nicholas, or Drake's Island, a pyramidal rock strongly fortified. The Sound is open to the S.W., from which direction strong winds frequently blow, and violent surges are thrown in from

the Atlantic. A massive stone breakwater, 1,700 yards in length, costing about £1,500,000. was completed 1841. (See BREAKWATER.) On a sunken rock just inside the breakwater and at its centre, a strong stone fort has been erected; and an extensive series of stone batteries has been built at Bovisand and Picklecombe on the mainland, on either side of the entrance to the harbor. 14 m. s.s.w. of Plymouth is Eddystone Lighthouse. (See EDDYSTONE.)

PLYMPTON, *plĭmp'ton*, ALMIRA GEORGE: American author: b. Boston, Mass. She was educated in the private schools of Boston and has gained a reputation as an anthor of Juvenile books. Among them are: *A Willing Transgressor; Penelope Prig; Rags and Velvet Gowns; Gerald and Geraldine; In the Shadow of the Black Pine.*

PLYMPTON, GEORGE WASHINGTON: American engineer and educator: b. Waltham, Mass., 1827, Nov. 18; d. 1907, Sept. 11. He was graduated from the Rensselaer Institute of Technology, Troy, N. Y., in 1847, and was professor of engineering and architecture at the University of Cleveland in 1852, professor of mathematics at the New York State Normal College, Albany, in 1853–6, and in 1857–63 occupied the chair of physics and engineering of the State Normal School, Trenton N. J. He was professor of physics and engineering at Cooper Union, New York, from 1869, and director of the night school from 1879. He was also professor of physics and engineering at the Brooklyn Polytechnic Institute from 1863, professor of chemistry and toxicology at the Long Island College Hospital 1864–86, editor of Van Nostrand's *Engineering Magazine* in 1870–86, and published *The Starfinder* (1878); *How to Become an Engineer* (1892); etc.

PNEUMA-, prefix, *nū-ma-* [Gr. *pneuma, pneumatos*, wind, air: *pneō*, I breathe]: pertaining to or connected with the air, gases, or breath.

PNEUMA: the animating spirit of the body. The word is not often used; it is of Greek origin and long since gave place to the cognate word, spirit, which is derived from the Latin. Both pneuma and spirit signified originally breath, and came to refer to the soul or essence of life because of the intimate relation between life and breath. The same stem is used in a variety of English words such as pneumatic, where it carries with it the original meaning of air or breath.

PNEUMAGRAM, *nū'mă-grăm, n.* [Gr. *pneuma*, air, spirit; *gramma*, a writing, letter, document]: written message sent by pneumatic dispatch-tube—a term applicable especially when the very paper on which the sender has written his message is forwarded by tube instead of having its contents transmitted by telegraph.

PNEUMATIC, a *nŭ-măt'ĭk*, or PNEUMAT'ICAL, *a. ĭ-kăl* [Gr. *pneumatĭkos*, pertaining to breath, spiritual; *pneuma*, wind, air—from *pneō*, I breathe: F. *pneumatique*]: of or relating to air, to breathe, or to a gas; moved or played by means of air or wind; pertaining to pneumatics. PNEUMAT'ICALLY, ad. *-lĭ*. PNEUMAT'ICS, n. *-ĭks*, science which treats of the mechanical properties of air, and aëriform fluids, e.g., their weight, pressure, elasticity, motion, etc. The great representative of the aëriform fluids is the atmosphere. The atmosphere is frequently called 'air,' to distinguish it from the others known as 'gases.' The fact of air having weight and generally exercising pressure and resistance, was unsuspected by most of the ancients, though they were aware of the resistance in particular cases, from seeing and feeling the effects of the wind; but the idea that air in a state of rest exerts pressure on a body immersed in it, seems never to have occurred to them. Aristotle, however, asserted that air had weight, and so did several subsequent philosophers, but the truth of this was established first by Torricelli (q.v.), who also found the amount of this weight or pressure. (See ATMOSPHERE.) Pascal (q.v.) completed the investigation, and invented the Barometer (q.v.). The experiments of these philosophers proved that what is called 'suction' is nothing more than an effect of the pressure of the air on one side of the body, unbalanced by an equal pressure of air on the opposite side of it. To this property of air are due the working of the various kinds of Pumps (q.v), the Barometer (q.v.), the siphon, cupping-glass, etc. But the great distinguishing feature of aëriform substances is the repulsive force of their molecules toward each other, and the consequent expansion of these substances when pressure is removed, or compression when pressure is increased. The expansibility and compressibility of air was investigated by means of the Air-pump (q.v.), an invention of Guericke (q.v.), and soon resulted in the discovery of a law by Boyle (about 1650), and Mariotte (1676), called *Mariotte's Law* (q.v.), which affirms that 'at a given temperature the volume of a gas is inversely as the pressure.' (See GASES.) The second great law of tension and pressure is that of Dalton and Gay-Lussac (1801), which states that 'when the tension remains the same, the density of a gas varies inversely as the temperature'—i.e., when the temperature is increased by equal increments, the bulk is increased by equal increments. The motion of gases is subject to the same laws with that of liquids since those laws depend for their efficacy not on the liquidity, but on the fluidity (see FLUID) of these substances. The flow of gases in the tubes seems retarded by friction against the sides, in the same way as that of water is, and the diminished efflux at an office shows that the *vena contracta* exists for gases as well as for liquids. For examples and further explanations of the properties of air,

see ATMOSPHERE; BALLOON; BAROMETER; DIVING-BELL; MAGDEBURG HEMISPHERES; etc.

PNEUMATIC DISPATCH: mode of sending parcels, mail-bags, or telegram papers through a tube by atmospheric pressure, or by a partial vacuum.

The application of pneumatic tubes was originally suggested by Denis Papin, in 1667, when he read a paper before the Royal Society of London, describing a plan by which the air in a tube was exhausted in such a way that the piston working in the tube would be drawn in the direction of the suction, pulling with it an attached carrier. His idea was taken up and developed by several inventors, with more or less success, up to 1854, when the Electric and International Telegraph Company, of London, built in that city the first pneumatic despatch system which was actually operated for commercial purposes. It consisted of a lead tube 220 yards in length and 1½ inches in diameter, in which the carriers were propelled in one direction only. Subsequently, the diameter of the tube was increased to 2¼ inches, which were arranged to send the carriers in two directions—outward from, and inward to, the central station. At the present time the English Postal Department alone operates over 60 miles of tubes, 40 miles of which are situated in the London district. In the English system the tubes radiate from the central station to the branch stations located at various points, the larger stations being equipped with two tubes—one for outward and one for inward traffic, while the smaller stations carry on the work through a single tube. The out-going carriers are propelled by pressure and the incoming carriers are drawn in by the suction of a vacuum. The standard pressure used is about ten pounds to the square inch, giving about the same speed in both directions. The tubes consist of lead pipes 1½ to 2¼ inches in diameter, for interior use, such as the delivery of telegrams and parcels of small size, such as cash-carriers in stores, from one room to another in the same building; while the underground or street tubes are larger, ranging from 2¼ to 3 inches in diameter. The 2½-inch pipes weigh about 8 pounds per linear foot, and are made in lengths of 28 feet. When installed, they are enclosed in a cast-iron pipe 3 inches in diameter, made in sections of 9 feet. The air-pumps are driven by steam-engines, or by electric motors; those in the London district are worked by four 50 H. P. steam-engines. All of the carriers have gutta-percha bodies covered with felt, and are provided with buffers or pistons of felt attached to the front ends, which fit tightly in the tubes. The ends of the carriers are closed by elastic bands to prevent the messages from falling out, but they can be stretched sufficiently to allow the insertion of the message forms. The despatching and receiving apparatus originally consisted of a very complicated double-sluice

valve, but it has been superseded by the D-box, a contrivance much simpler in form, which allows communication at will with either the pressure or vacuum mains, so that it is available for both sending and receiving. The carriers run at a speed of about 25 miles an hour.

In Germany, the Siemens system is employed. Its first extensive use was made in Berlin, in 1865, when 5,670 feet of wrought-iron tubing, 2½ inches in diameter, were laid and connected the telegraph station with the Exchange. In this system, the tube forms a complete circuit, into one end of which the air is introduced under pressure while it is exhausted at the other end, thus maintaining a constant circulation, and also enabling the inserting and despatching of the carriers without temporarily shutting off the air current. The carriers were stopped at intermediate stations by placing a wire screen across the tube. The sending and receiving apparatus was constructed of two short pieces of tubing attached to a rocking frame so that either of them could be swung into the main circuit by the hand, whenever desired. One of them was open at both ends, and was used in sending; the other was provided with a wire screen at one end, and when swung into the line of the main tube, allowed the air to pass through but stopped the carrier. At the present time, Berlin has in operation about 30 miles of tubes, serving about 40 stations. As in the first experimental line, the tubes are laid in circuits, each of which serves a certain number of stations, but the air instead of being kept in constant circulation is stored up in large tanks, and turned into the tubes whenever it is required to despatch a carrier. Paris and Vienna have systems similar to that of Berlin. The carriers are run in trains despatched at 15 minute intervals, with a maximum speed of 23 miles an hour. They stop at all of the stations on the circuit so that the carriers belonging to each station can be taken off and those for the succeeding stations put in.

In the United States the first attempt to establish a pneumatic despatch system was made by Beach, about 1872, who undertook the construction of a tunnel six feet in diameter under Broadway, New York city. His system was called the 'atmospheric railway' (q.v.), and contemplated the running of a car capable of seating ten persons, through the tube, by the propelling energy of air pressure generated by a revolving fan. The project was abandoned after the completion of a small section of the tunnel. The systems installed by the United States Postoffice Department are as follows: The Philadelphia lines connecting the city postoffice with the Bourse, a distance of 2,974 feet, and its extensions to the terminal stations of the Pennsylvania, and the Philadelphia & Reading railroads, a total distance of about 1½ miles; and the New York city lines, connecting New York city postoffice with that of Brooklyn, and with the Grand Central Station and the intermediate postal sub-

stations, a total distance of about ten miles. The installation is on the plan of the Batcheller system, very similar to that employed by the English. Compressed air at pressures ranging from 5 to 10 pounds per square inch is forced through wrought-iron tubes ranging from 6 to 8 inches in diameter. They are laid in double lines so as to allow traffic in opposite directions, and are provided with automatic sending and receiving apparatus at all stations. In addition to the lines operated by the government, they are extensively used by private concerns in a great many cities, of which, the systems operated by the Western Union Telegraph Company in New York city and Chicago are the most important.

Bibliography.—More detailed information may be obtained from the following named publications: *Pneumatic Tube Service* (published by the Postmaster-General, Washington); Batcheller, *The Pneumatic Despatch System;* Kemp, *Year Book* (London, 1902); and various publications on the subject by the British Postal Service.

PNEUMATIC DYNAMITE GUN: machine for projecting to great distances, by means of compressed air, a shell heavily loaded with dynamite to be exploded by impact or by time-fuse. (See CANNON; GUN; GUNNERY; etc.) It was designed chiefly for coast defense, either on land stations or on cruisers. For some years it had been in experimental stages, its development having been due largely to Lieut. E. L. Zalinski, of the U. S. army. It was subsequently brought to comparative perfection by the immersion-and-impact fuse, invented by Henry P. Merriam, of New York, and by various improvements due to the fertile genius of Capt. John Rapieff, of the Russian artillery, afterward chief engineer of the (Amer.) Pneumatic Dynamite Gun Co. The perfected gun (one of six ordered by the Brit. government), made by the West Point Foundry Co., at Cold Spring, N. Y., was tested there 1890, July 8, in presence of Brit. and U. S. officers. The barrel, of five sections united, was 50 ft. long 3 in. thick, weighing 73,000 lbs., with 15 in. calibre, and was supported by hollow trunnions, through which, from reservoirs on both sides, the compressed air (which was the projecting force) entered an iron jacket around the breech, whence by automatic valves it was admitted to act on the projectile. The air, compressed by engines, was first stored in the storage reservoir, at 2,000 lbs. pressure, and from this was admitted to the firing reservoirs or boxes with 1,000 lbs. pressure, or less at will, being regulated by an automatic firing-valve. The sighting apparatus, designed by Lieut. Zalinski, was attached to the left trunnion, and consisted of telescopes so arranged as to meet all requirements, even the lateral movement of wind or current. Elevation and training to any point of the compass were operated by electric or water motor; one man could do all with his

hand on a lever, except loading the projectile, which was brought into position by a carriage on a circular railway. The projectile demanded as much ingenuity as the gun, the objects being to secure safety in handling, to prevent explosion at start, to time the explosion when the purpose was to produce it under water, likewise to effect it immediately when a solid was struck. The shell had a front chamber with very complicated apparatus—a piston held by a safety latch, unlocked when the piston was depressed by atmospheric resistance (after the shell was fired); the piston was perforated by a spindle which revolved by action of air on its projecting flanges, until, owing to its screw thread, it dropped out and released a supported steel ball, that, at the instant of impact with water, fell on percussion caps; these ignited time-trains of gunpowder connecting with fulminating mercury and auxiliary gun-cotton. The piston-head itself, as well as a set of percussion caps, insured the same if the shell struck a solid such as an enemy's ship. The arrangement was such as to start the explosion at the rear end of the shell, thus increasing the penetrating power. At the trial above mentioned, July 8, dynamite was prohibited, but the results satisfied the Brit. officers. The contract required a 200-lb. shell to be thrown 3,500 yds. (about 2 m.); 520 lbs. was thrown 4,008 yds. (about 2¾ m.). A full calibre projectile weighs 1,000 lbs., of which half would be dynamite, and the range would be nearly 1½ m.; and a sub-calibre shell with 50 lbs. of dynamite could be thrown nearly 3½ miles.

The final test of the guns of the dynamite cruiser *Vesuvius* took place 1890, March 13, on the Delaware River; a 204-lb. shell, filled with gun-cotton, was thrown a third beyond the required mile, with only 700 lbs. pressure. The *Vesuvius* has 3 pneumatic dynamite guns; the sub-calibre shells, 10½ in. diam., carry 201 lbs. of explosive gelatine and dynamite; the full calibre, 15 in. diam., carry 600 lbs. charge—the largest movable torpedoes made. In the Spanish-American war of 1898 the *Vesuvius* rendered effective service in bombarding Santiago de Cuba and its defenses. Seven of the new perfected guns were ordered for the U. S. government of which three were to be stationed at Sandy Hook, two at Fort Schuyler, and two at Fort Warren. In 1902 the government decided to provide the most important coast defenses with more effective pieces of ordnance, and the pneumatic gun plant at Sandy Hook that cost nearly $1,000,000 was sold for $20,000.

PNEUMATICS: a former name for the science that discusses the properties of gaseous fluids. It is a branch of hydrodynamics (q.v.). See GAS; SOUND; WIND; WAVE.

PNEUMATIC TROUGH: chemical apparatus devised by Priestly, now in daily requisition in every laboratory,

by which gases can be collected in vessels for experiments or examination, and can be decanted, like liquids, from one jar to another. It consists of a vessel of water, provided with a ledge or shelf two or three inches from the top. The jars in which the gas is to be collected are filled with water, and placed with their mouths downward on the shelf, which is kept a little under water to prevent entrance of air into the jars. When the edge of the jar is brought over the extremity of the tube carrying the gas, the bubbles of gas rise through the water, collect in the upper part of the jar, and displace the liquid. As soon as a jar is filled, it may be removed by sliding under its open mouth while still under water a plate or tray containing enough water to cover the edge of the jar; and oxygen and many other gases may be thus preserved for hours. Another jar full of water is substituted for the removed jar. The trough is constructed best of japanned copper; and in the shelf a groove should be made about half an inch in width and the same in depth, to admit the extremity of the gas-delivering tube beneath the jar.

PNEUMATO. See PNEUMA-.

PNEUMATOCELE, n. *nū-măt'ō-sēl* [Gr. *pneuma*, air or wind, *pneumatos*, of air; *kēlē*, a tumor]: in *surg.*, a tumor filled with flatus or air.

PNEUMATOCYST, n. *nū-măt'ōsĭst* [Gr. *pneuma*, air; *kustis*, a cyst—from *kuein*, to hold]: the air-sac or float of certain of the oceanic Hydrozoa.

PNEUMATOLOGY, n. *nū'mă-tŏl'ŏ-jĭ* [Gr. *pneuma*, air or wind; *logos*, a discourse]: the science of the properties of elastic fluids; the science or doctrine of mind or spiritual existence: a treatise on them. PNEU'MATOLOG'ICAL, a. *-tō-lŏj'ĭ-kăl*, pertaining to pneumatology. PNEU'MATOL'OGIST, n. *tŏl'ŏ-jĭst*, one versed in pneumatology.

PNEUMATOMETER, n. *nū'mă-tŏm'ĕ-ter* [Gr. *pneuma*, air or wind, *pneumatos*, of air; *metron*, a measure]: an instrument for measuring the quantity of air which can be taken into the lungs at one inspiration.

PNEUMATOPHORE, n. *nū-măt'ō-fōr* [Gr. *pneuma*, air; *phorĕō*, *I bear*]: the proximal dilatation of the cœnosarc which surrounds the pneumatocyst in the Physophoridæ.

PNEUMATOSIS, n. *nū'mă-tō'sĭs* [Gr. *pneumatōsĭs*, an inflating; *pneumatoō*, I inflate—from *pneuma*, air]: in *med.*, a swelling containing air or gas.

PNEUMO-, prefix, *nū-mo-* [Gr. *pneumōn*, a lung]: pertaining to or connected with the lungs.

PNEUMOGASTRIC, a. *nū-mō-găs'trĭk* [Gr. *pneumōn*, a lung; *gaster*, the belly]: in *med.*, of or pertaining to the lungs and stomach; applied to a nerve, the tenth nerve, extending over the viscera of the chest and abdomen. The *Pneumogastric Nerve* derives this name from

its supplying the lungs and stomach with nervous filaments; and it nas a second name, *Par Vagum*, from the wandering course which it pursues. It emerges from the medulla oblongata by eight or ten filaments, which unite and form a flat cord that escapes from the cavity of the cranium (in association with the glossopharyngeal and spinal accessory nerve) by the jugular foramen. In this foramen it forms a well-marked ganglionic swelling, while another is observed immediately after its exit from the skull. The nerve runs straight down the neck and between and in the same sheath as the internal jugular vein and the carotid artery. Below the root of the neck its course is different on the two sides: the right nerve running along the back of the œsophagus, is distributed to the posterior surface of the stomach, and finally merges into the solar plexus; while the left nerve runs along the front of the œsophagus to the stomach, sending branches chiefly over its anterior surface. This is a mixed nerve, containing filaments both of sensation and of motion. The pulmonary branches exercise a most important influence on the respiratory acts; for when the pneumogastrics on both sides have been divided above the giving off of the pulmonary branches, the most severe dyspnœa comes on, the number of respirations is much diminished and the animal breathes as if asthmatic; after a short time, the lungs become congested and dropsical, and the bronchial tubes filled with a frothy serous fluid; and if the cut ends of the nerves are kept apart, the animal never survives above three days. The gastric branches influence the movements of the stomach, while their destruction does not materially affect the secretion of the gastric juice or the process of chylification. Loss of voice and difficulty of breathing have been frequently traced to the pressure of an eneurysm or other tumor on the recurrent or inferior laryngeal. The violent spasmodic cough which accompanies enlarged bronchial glands is due probably to the irritation of the pulmonary branches of the pneumogastric. Vomiting may be excited by irritation of the central or distal extremities of the nerve. In disease of the brain, the vomiting, after an early symptom, is caused by irritation of the central extremity; and by introducing emetic substances into the stomach, the vomiting is produced by irritation of the peripheral (or distal) filaments. The nerve sends two branches, a superior and an inferior cardiac, to the heart. The upper of these conveys sensation and nerve impulses from the heart to the brain; the lower nerve, when in action slows the motions of the heart. The sympathy between the digestive and the respiratory and circulating organs, is explained by the anatomical relations of this nerve: e. g., both asthma and palpitation of the heart are often traceable to some deranged state of digestion.

PNEUMONIA.

PNEUMONIA, *nū-mō′-nĭ-a* [Gr. *pneumōn*, lung, *pneö*, breathe]: inflammation of the lung, commonly called lung fever. Most proper term is pneumonitis *nū-mō-nī′-tĭs* [*-itis*, inflammation]. There are different forms of pneumonia or inflammation of the lungs due to different causes as follows:

1. *Lobar, croupous or fibrinous pneumonia*, caused principally by the pneumococcus of Fraenkal.

2. *Lobular catarrhal or broncho-pneumonia*, caused by various chemical, mechanical or bacterial agents resulting from the aspiration of irritating fumes, particles of food or diseased tissue, or by different kinds of bacteria which are normally found in the mouth and especially in the saliva. It occurs most frequently in children. Is a serious affection, often fatal, and is often called catarrhal bronchitis.

3. *Purulent pneumonia, or abscess of the lung*, caused by pus-producing bacteria, and usually follows some other disease of the lung, such as pneumonia, tuberculosis, etc.

4. *Caseous or tuberculous pneumonia*, caused by the bacillus tuberculosis, and a result of the aspiration of tuberculous material from a focus in some other part of the organ. It readily involves the lung, producing what is known as quick or galloping consumption. A part of the lung involved becomes solid and is changed to a caseous substance which has the yellowish color and consistency of cream cheese.

5. *Syphilitic or white pneumonia*, caused by the microorganism of syphilis, and is usually present at the time of birth and the result of transmission from the mother. It is called white pneumonia because the lungs are white as compared with the lungs of a normal individual at birth, which are pink.

6. *Hypostatic pneumonia*, resulting from congestion of the lungs, especially when there is a weak circulation and the patient rests in a certain position for a long time. It occurs in connection with such diseases as typhoid fever or paralysis, and may usually be prevented by having the patient turn from side to side several times a day.

Ordinarily when we speak of pneumonia or lung fever we refer to the form that occurs most frequently, namely lobar, croupous or fibrinous pneumonia; called lobar, because it involves one or more lobes of the lung; croupous because it is characterized by a croupous cough; and fibrinous because the lungs become filled with blood corpuscles bound together in a solid mass by fibrin. Pneumonia ranks next to tuberculosis as the cause of death, and in some countries, as England, and some of the larger cities, as New York and Chicago, often outranks consumption, causing as it does about $\frac{1}{7}$ to $\frac{1}{10}$ of all deaths. It may, therefore, properly be called the 'Captain of the men of death,' a term which John Bunyon applied to consumption. It occurs most frequently in young children, in those subject to exposure, in alcoholics and in the aged. It may indeed be said to be the friend of the aged, as it causes

them to be taken away in a short and only slightly painful illness, and thus permits them to escape those 'cold gradations of decay' frequently so distressing.

Causes.—The causes of pneumonia may be divided into predisposing, such as exposure to cold, excessive use of alcohol, injury to chest, the existence of some other disease in the body or anything that lowers the vitality of the system, and the real or exiting causes of pneumonia which are always bacteria. The germ which is the cause of about 90 per cent of all cases of pneumonia is the diplococcus pneumoniæ, or the pneumococcus of Fraenkal. It is a germ that is found almost constantly in the saliva of every human being and was first discovered in 1880 by Sternberg, an American bacteriologist, but it was not known that it was the cause of pneumonia, until 1884 when such was determined by Fraenkal of Germany. Although this germ is found in the saliva of healthy individuals it does not ordinarily possess any marked disease-producing properties, and it is only after the system has been weakened by predisposing causes that it gains a foothold and produces the disease. Other bacteria which are sometimes associated with pneumonia are the pneumobacillus of Friedländer, staphylococcus, streptococcus, influenza, typhoid and the diphtheria bacillus. Pneumonia is, therefore, an infectious disease, and although it is not very contagious it is sometimes transmitted to other members of the family and occasionally produces small epidemics in a community.

Nature of the Disease—Pathology.—The pathology of pneumonia may be divided into three stages: First, the stage of engorgement, in which the vessels of the lungs become markedly distended and a large amount of blood passes into the air sacs. This gives to the lung a dark color. On section blood oozes out freely and the physician is able to hear moist rales, and the blood mixed with the mucous from the bronchial tubes causes the sputum, which is usually quite large in amount, to be of a rusty color. This stage lasts from a few hours to a few days and is followed by the stage of solidification which results from the coagulation of the blood which escaped in the air cells during the first stage. The lung becomes perfectly solid, appears very much like liver structure and is therefore said to be hepatic-like and the stage known as that of hepatization. It is first necessarily of a dark red color, caused by the large amount of red blood corpuscles. Soon, however, the red blood corpuscles are disintegrated and white blood corpuscles, ever wandering to the place where there is an inflammation, accumulate in enormous numbers, so that in a few days after the beginning of the stage of red hepatization as the early part of the stage of consolidation is called, the lung gradually changes from a red color to a grayish color, and forms the stage of gray hepatization which represents the later part of the stage of consolidation. The entire stage of consolidation, including both red and gray hepatization, lasts about 6 days. This

is followed by the third stage or the stage of resolution, during which there is a softening of the material filling the air sacs and its removal from the lungs principally by means of the lymphatics and by expectoration. This stage lasts from 5 to about 10 days before it is completed and the lung normal. Pneumonia affects principally the lower lobes of the lungs. In about 50 per cent of the cases the right lower lobe is affected; in about 30 per cent the left lower lobe; in about 15 per cent both lower lobes, and in about 5 per cent of the cases the disease affects the other lobes.

Symptoms.—Pneumonia usually begins suddenly, usually with a severe chill lasting 15 to 30 minutes. Soon after the chill the temperature begins to rise, with headache and acute frequently agonizing pain in the side; frequently also there is a dry, painful cough. Patient prefers to lie on the affected side, face is flushed and breathing rapid. In about 12 hours the temperature is up to about 104° F, and remains high for 5, 7, 9, or 11 days, when it suddenly drops at a time called the crisis which inaugurates the period of convalescence. The temperature usually falls to about normal and remains there. The pain, difficulty of breathing and cough may exist during the entire time. The sputum at first consists of mucus but becomes rusty colored in about 24 hours. During the stage of resolution it again becomes of a grayish color.

Diagnosis.—Symptoms mentioned, together with an examination of the patient by inspection, palpation, percussion and oscultation—methods which can only be carried out by a physician—generally make the diagnosis fairly easy and certain.

Treatment.—No one should attempt to treat so fatal a disease as pneumonia, except a well qualified physician. As yet no medicine has been found to be a specific for pneumonia. It may be said that the treatment consists principally in the relieving of the pain, eliminating the poisons of the pneumococcus, preventing or reducing the high temperature and supporting the circulation. Other symptoms and complications must be treated as they arise.

Complications.—Pneumonia may be complicated with a number of conditions such as pleurisy (inflammation of the pleura), which is very common, pericarditis (inflammation of the membrane about the heart), degeneration of the heart muscle, endocarditis (inflammation of the valves of the heart), meningitis (inflammation of the membranes of the brain), inflammation of joints, middle ear, frontal sinus and other parts of the body.

Termination.—The termination most frequent and always hoped for is resolution, which means the complete return to the normal. If many pus-producing bacteria gain entrance an abscess or pus formation may result. If putrefying bacteria enter there is liable to be gangrene or putrefaction of the lung. If the individual is in a state of low vitality the disease may continue to run a rather

long course producing a thickening of the lung tissue called induration. The mortality ranges from 25-30 per cent.

Precautions to Prevent Pneumonia.—We should avoid exposure to cold, especially dampness which permits the heat from the body to pass away very rapidly. People should never be exposed to cold draughts, nor allow their feet to remain wet for any length of time, since moisture is a good conductor of heat. Individuals having an ordinary cold should be very careful and be relieved of it as soon as possible, since it predisposes the system to pneumonia and other diseases. The germ which causes pneumonia is found in the mouth of almost every healthy person. The reason why such a person does not contract the disease is principally because the system is strong enough to prevent its entrance. We should, therefore, carefully observe those rules of diet, sleep, exercise and hygiene which will make the system as strong and resistant as possible. (See BODY.) Daily brushing of the teeth and rinsing of the mouth with water will remove about 90 per cent of the bacteria. This should never be neglected as in that way the causitive agent of pneumonia is to a large extent removed. The sputum of a pneumonia patient contains millions of the pneumococci. It should therefore be disinfected. The eating utensils, handkerchiefs, and bed-clothing of the patient should also be disinfected by thorough boiling before being used by other members of the family. Those nursing pneumonia patients should carefully wash their hands and preferably disinfect them after coming in contact with the patient or whenever the patient has been handled. Although the germ which produces the disease is ordinarily found in the mouth of a healthy individual, yet the germ which comes from a pneumonia patient has much more disease-producing properties than those occurring under normal conditions. Patients who have recovered from pneumonia should be exceedingly careful for sometime so as not to catch a cold, since the recently inflamed lung is very susceptible to reinfection with the same germ, producing a relapse, or with some other germ such as the micro-organism, which produces tuberculosis or consumption.

PNEUMOTHORAX, n. *nū′mō-thō′răks*, or PNEU′MATOTHO′RAX, n. *-mă-tō-thō′răks* [Gr. *pneuma*, air; *thōrax*, the chest]: the escape of air or gaseous effusion into the pleura through a laceration of the lung.

PO, *pō* (anc. *Eridanus* and *Padus*): largest river of Italy; rising in two springs on the n. and s. sides of Monte Viso, one of the Cottian Alps, close to the French frontier; lat. about 44° 40′ n. It flows e. more than 20 m.; and arriving before Saluzzo, it emerges from its rocky defiles, and enters upon the plain, flowing n.n.e. past Turin; and at the town of Chivasso, turning e. to its embouchure in the Adriatic. More than 50 m. above its mouth, it begins to form its delta, the principal branches being the *Po della Maestra*, on the n., and the *Po di Primaro* on the s. Its total

MATOAKA ALS REBECKA FILIA POTENTISS
POCAHONTAS VIRGINIA
Ætatis suæ 21. A. 1616
Matoaks als Rebecka daughter to the mighty Prince
Powhatan Emperour of Attanough komouck als Virginia,
converted and baptized in the Christian faith, and
Wife to the Wor.ll Mr Tho Rolff.

POCAHONTAS.

length is 400 m.; it becomes navigable for small barges 60 m. from its source, and drains nearly 40,000 sq. miles.

PO'A: see MEADOW GRASS.

POACH, v. *pōch* [OF. *pocher*, to thrust or dig out with the fingers—land was said to be poached when it was trodden into holes and mire by heavy cattle: F. *pocher*, to bruise (see POKE 1)]: to intrude or encroach upon the grounds of another to steal or plunder, especially game; to take game by unlawful means; to plunder by stealth; to cook by boiling slightly, as eggs broken and poured among boiling water, or cooked with butter. POACH'ING, imp.: N. trespass in pursuit of game; the employment of a poacher (see below). POACHED, pp. *pōcht:* ADJ. stolen; slightly boiled or dressed, as eggs broken among boiling water. POACH'ER, n. *-ėr*, one who steals game. POACH'Y, a. *-ĭ*, wet and soft, as land; swampy. POACH'INESS, n. *-ĭ-nĕs*, state of being wet and soft, as land; swampiness. *Note.*—Skeat suggests that a 'poached egg' is the same as 'pouched egg'; the egg is likened to a pouch, because the art is to dress it in such a way as not to let the yolk escape. F. *pocher* may in this case be derived from *poche*, a pouch.

POACHARD, *pōch'ėrd*, or POCHARD, n. *pō'chėrd* [from POACH]: species of duck: see POCHARD.

POACH'ING: not strictly a legal term, yet in such wide popular use in Great Britain that it is frequently used in legal works, to denote trespassing on another's lands to catch or pursue game; likewise to denote the cognate offense of unlawfully catching or pursuing fish in another's waters. The British laws are voluminous and severe on this class of offenses; and the customary defense of this severity is based on the statement that P. is only stealing under a milder name—game being as really the fruit of the soil as apples; and further, that the transition from P. to actual stealing is easy and even inevitable. See GAME, for the general law; and particularly for English laws, Oke's *Game Laws*, by Bund, 7th. ed. See also Paterson's *Fishery Laws*, and Oke's *Fishery Laws*, by Bund, 2d. edition.

POACITES, n. plu. *pō'ă-sīts* [Gr. *poa*, grass]: in *geol.*, fossil monocotyledonous leaves; a general term for fossil grass-like leaves.

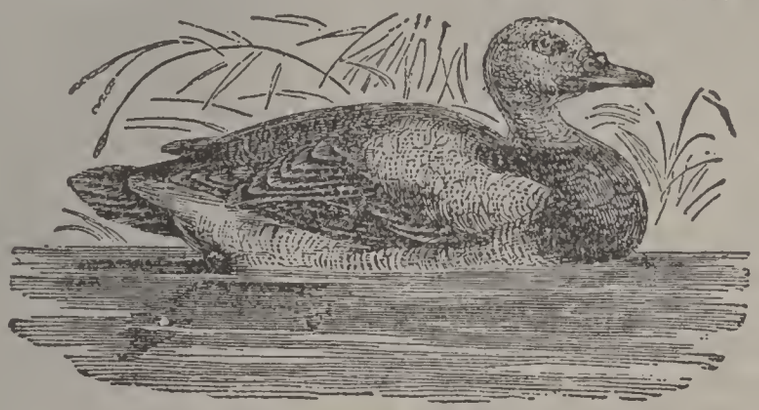
POCAHONTAS, *pō-ka-hŏn'tas:* Indian princess: about 1595–1616, Mar. 21; b. Va; daughter of Powhatan, who was chief of a confederacy of more than 40 clans of Indians of Algonquin connection and speech, whom Captain John Smith, in the first year of the planting of the English colony in Va. (1607), found in possession of all Va. below the falls of the James and Chickahominy rivers. In exploring the upper course of the Chickahominy, and venturing inland with a single Indian guide, Smith was captured, 1607, Dec., and, as he told the story, escaped death, after a formal condemnation, only by the intervention of P., then a girl of about 12 years, who threw herself upon him just as her father's club was raised to dash out his brains. Doubt has been thrown on the story on the ground that of three narratives of Smith's experience only

the third, 12 years after the events, and not wholly by him, has any reference to the romantic incident. To this, the reply is made that part in the earlier narratives is known to have been suppressed, and that indications point to the paragraph relative of Powhatan's unfriendly action as having been omitted lest it should discourage emigration to Va. Smith was detained seven weeks in captivity, and then sent home in charge of 12 Indian guides. The friendly interest of P. was later shown, 1609, by a visit to the colony to give Smith news of an intended Indian attack, and by the supplies of corn sent by her on several occasions. Capt. Argall, an adventurer seeking trade with the Indians on the Potomac, found means to capture P., with the aid of a chief there whom he bribed with a brass kettle; and her detention at Jamestown, where Argall carried her, would have made trouble for the colony, had not a young Englishman, John Rolfe, a respectable colonist who had won her favor, made an offer of marriage, to which Powhatan willingly consented. P. was baptized as Rebecca, was wedded 1613; and 1616 was taken to England with her husband and several Indian attendants. She was greatly admired for her modest and graceful demeanor, and, on Smith's report of her services to himself and the colony, was made recipient of many social attentions, being entertained by the Bp. of London, and presented by Lady De la Warr to King James. As an Indian princess, she was styled Lady Rebecca. Her husband was provided with the office of sec. to the colony. P. never learned to write. She died of small-pox at Gravesend, just as she was about to return to Va. An infant son, Thomas Rolfe, survived, and through him, many leading families of Va., e.g., the branch of the Randolphs from which John Randolph of Roanoke was descended, trace descent from the princess.

POCHARD, *pŏ'chĕrd*, or POACHARD, *pōch'ĕrd* (*Fuligula*): genus of ducks, of the oceanic section (see DUCK), having the bill as long, or nearly as long as the head, broad and very flat, a little dilated toward the tip, the lamellæ of the upper mandible not projecting beyond the margin, the wings and tail short, the tail rounded. The windpipe of the male, in all the the pochards, terminates in a labyrinth composed partly of bone and partly of membrane. There are numerous species, some of them natives of the arctic regions; some found, at least in winter, on the coasts of most parts of N. America, Europe, and Asia; and some in the s. hemisphere.—The RED-HEAD or AMERICAN POCHARD (*F. ferina americana*) has the iris orange, and the head and neck of pure chestnut, with bronzy or coppery-red reflections, whereas the Canvas-back (for which it is often sold) has the head and neck dark reddish-brown, dusky on top and around the bill.—The EUROPEAN POCHARD (*F. ferina*), known also as the Dun Bird, Red-headed Poker, and Red-eyed Poker, has the same fine waved lines on the back as the two above mentioned, but the ground is white, as in the Canvas-back, which, however, has the lines mostly broken up into little chains of dots. The European P. is smaller than the mallard, but rather larger than the wigeon. The

MARRIAGE OF POCAHONTAS.

head and neck are bright chestnut, the eyes red, like the eyes of the Canvas-back. It is esteemed for the table. Great



Pochard (*Fuligula ferina.*)

numbers are sold every winter in the London market. —The TUFTED DUCK (*F. cristata*) is a frequent winter visitant of bays, estuaries, and lakes of Britain; it is a plump and short bird; black, with a white bar on the wing; the breast, belly, and sides white; and the occipital feathers are elongated.—The CANVAS-BACK DUCK (*F. Valisneria*) of N. America is a species of P., very like the Common P.,

Canvas-back Duck (*Fuligula valisneria*).

but much larger, with the bill higher at the base, and less dilated toward the tip. The upper parts are whiter. The Canvas-back Duck breeds in n. parts of America, and migrates southward in flocks in autumn. In winter it abounds on the Chesapeake and its tributaries, and is common southward to New Orleans, often collecting in very large flocks, particularly toward evening. It is very shy, but vast numbers are killed, as it is in very high esteem for the excellence of its flesh, due to feeding, in some localities, on *Vallisneria spiralis* (Tape-grass, Eel-grass, called Wild Celery); otherwise the flesh has no claim to superiority. Of the same genus are the Greater and the Lesser Scaup Ducks and the Ring Neck, all of N. Amer. Some have separated these as *Fulix*, the Canvas-back as *Aristonetta*, and the Crested Pochards as *Fuligula*.

POCK, n. *pŏk* [Dut. *pocke*, a pustule or bubble, as of morbid matter on the flesh: Ger. *pocke;* AS. *poc*, a pock] a pustule or small bubble on the skin full of morbid matter in an eruptive disease, as the small-pox. POCKY, a. *pŏk'i*, infected with small-pox; full of pocks. POCK'INESS, n. *-i-nĕs*, the state of being full of pocks. POCK-MARK, one of the pits or scars left by the small-pox. POCK PITTED, marked by the scars left by small-pox. POCK-PUDDING [see POKE 2]: in *Scot.*, a pudding, generally of oatmeal, cooked in a cloth bag or covering; a glutton; an opprobrious epithet applied by old Scotch writers to Englishmen.

POCKET, n. *pŏk'ĕt* [F. *poche;* Guernsey, *pouquette*, a small sack: O.Norm. *poque;* Dut. *poke*, a pocket]: a small pouch or bag attached to or inserted in a garment; in *billiards*, one of the nets that receive the balls; a certain quantity contained in a bag, as of hops: V. to put or conceal in a pocket; to take secretly. POCK'ETING, imp. POCK'ETED, pp. POCK'ETFUL, n. *-fûl*, plu. POCK'ETFULS, as much as a pocket will hold. POCKET-BOOK, a case containing a memorandum-book, loose papers, etc. POCKET-GLASS, a portable looking-glass. POCKET-HANDKERCHIEF, a napkin of silk, linen, or cotton carried in the pocket for use. POCKET-KNIFE, a knife with one or more blades which fold into the handle. POCKET-MONEY, money allowed for occasional or petty expenses. POCKET-PICKING, the act or practice of stealing from the pocket. POCKET-PISTOL, a firearm that can be carried in the pocket; *familiarly*, a flask of liquor carried in the pocket. TO POCKET AN INSULT or AN AFFRONT, not to resent it or seek redress. POCKET OF HOPS, a bag of hops—from ½ to 2 cwts.

POCO, ad. *pō'kō* [It.]: in *music*, a term indicating the measure of the time, force, movement, etc., and signifying a little: e.g., *poco animato*, rather animated; *poco forte*, abbreviated *pf.*, rather loud; *poco a poco*, by degrees, little by little; *poco a poco crescendo*, becoming loud by degrees; *poco a poco rallentando*, becoming slower by degrees.

POCOCK, *pō'kok*, EDWARD, D.D.: eminent Oxford prof. of oriental languages: 1604, Nov. 8—1691, Sep. 10; b. and d. Oxford, England. He graduated there 1622; edited the Syriac versions of II Pet., and II and III John: pursued his study of oriental languages while English chaplain at Aleppo 6 years; returning 1636, when he was made prof. of Arabic at Oxford. He visited Constantinople 1637–39 seeking MSS.; afterward, while holding his chair at the univ., was appointed rector of Childrey, Berkshire (1643), and nominated prof. of Hebrew and canon of Christ Church, 1648. Among his publications were an annotated edition, with Latin translation, of portions of the Arabic writings of Abulfaragius, under the title *Specimen Historiæ Arabum* (1648-50),—his chief work being his edition of *Gregorii Abul Farajii Historia Dynastiarum*, Oxford 1663, discourses on the Mishnah commentaries of Moses Mainonides, entitled *Porta Mosis* (1655), Latin translations of the *Annals* of Eutychius (1658), Arabic translation of the *De Veritate* of Grotius; Latin translation

of poem by Ismael Thograi; Arabic translation of the Church catechism and liturgy; commentaries on the prophets Micah, Malachi, Hosea, and Joel (1677–91). He gave important aid in preparation of Walton's Polyglot Bible (1657), being consulted throughout by Walton. His life and theol. writings were edited by Leonard Twells (1740). One of his sons, Edward, was author of translations from the Arabic; and another, Thomas, from the writings of Menasseh ben Israel.

POCULIFORM, a. *pŏk'ū-lĭ fawrm* [L. *poculum*, a cup; *forma*, a shape]: in *bot.*, cup shaped.

POD, n. *pŏd* [Dan. *pude*, a pillow: Esthon. *paddi*, a cushion, a pad: Bret. *pod*, a pot: of Celtic origin—comp. Gael. *put*, a large buoy]: the pericarp or seed-vessel of such plants as the pea, bean, etc. (see LEGUME): V. to swell or fill, as a pod; to produce pods. POD'DING, imp. POD'DED, pp.

POD-: see PODO-.

PODAGRA, n. *pŏd'ă-gră* [L. and Gr. *podagra*, gout in the feet—from Gr. *pous* or *poda*, a foot; *agra*, a seizure]: the Gout (q.v.). PODAG'RIC, a. *-ăg'rĭk*, or PODAG'RICAL, a. *-rĭ-kăl*, pertaining to the gout; gouty.

PODARGUS *pō-dâr'gŭs:* genus of birds of family *Caprimulgidæ* nearly allied to the true Goat-suckers (q.v.), but having no connecting membrane at the base of the toes, and the middle toe not pectinated. Some interesting species are natives of Australia, strictly nocturnal in their habits, and remarkable for the difficulty with which they are roused from their sleep by day. *P. humeralis* may be pushed off a branch, and seems scarcely to waken so as to save itself from falling to the ground; and if two are sitting together, as is usually the case, one may be shot without its mate being much disturbed. But by night this bird is all activity.—*P. Cuvieri*, disturbs the night by a hoarse cry, resembling the syllables *More Pork*, by which name it is therefore known in New South Wales.

PODESTA, n. *pō-dĕs-tâ'* [It. *podestà*—from L. *potestas*, power, authority]: Italian municipal magistrate. The name was applied first to foreign magistrates with supreme authority, whom Emperor Frederick Barbarossa placed over the Italian towns, after subjugating them. In the 13th and 14th c. an officer bearing the same designation appears, at first occasionally, like the Roman dictator, afterward in most Italian cities as a permanent magistrate, appointed either by the constituent parliament, or by the Great Council; he superseded all the ordinary magistrates, the military officers, and occasionally the judges. The cause of appointing such an officer was the jealousy between the richer citizens and the nobles; the P. was a stranger, generally belonging to the nobility, and prohibited during his term of office from forming any intimate connections in the city which he governed. His chief duty was the execution of summary justice on the lawless barons; and in the great Lombard towns he generally obtained a predominance for the citizens. Occasionally,

however, the P. became too strong for both parties, securing his re-election during a succession of years, and becoming the despotic ruler of the city.—The name is given in many Italian towns to an inferior municipal judge.

PODETIUM, n. *pŏd-ē'shĭ-ŭm* [Gr. *pous* or *poda*, a foot]: a stalk-like elevation, simple or branched, rising from the thallus in some lichens.

PODGE, n. *pŏj* [Ger. *patsche*, a puddle, mire: Bav. *batzen*, a lump of soft materials]: a puddle; prov. Eng. for *porridge*. HODGE-PODGE, a mixed mass; a medley of ingredients: see HODGE-PODGE. PODGY, a. *pŏj'ĭ*, dumpy and fat.

PODGORITZA, *pŏd-gō-rĭt'sâ:* fortified town of Montenegro, in the district ceded to Montenegro by Turkey in terms of the treaty of Berlin; about 35 m. n. of Scutari. Pop. about 7,500.

POD'ICEPS: see GREBE.

PODIEBRAD, *pod-yā'brâd*, AND KUNSTAT, *kûn'stât*, GEORGE BOCZKO OF: powerful Bohemian noble, of the Hussite party: 1420–1471, Mar. 22; son of Herant of Kunstat and Podiebrad. While still a youth he threw himself, with all the ardor and resolute force of his nature, into the Hussite struggles. Like the rest of his family, however, he adhered to the moderate party of the Hussites during the govt. of King Sigismund; but when, on the death of that monarch, the Rom. Cath. barons (1438) carried the election of Albrecht V. of Austria (II. of Germany), P. allied himself with the Utraquist Orders in Tabor, and offered the sovereignty of Bohemia to Casimir, King of Poland. Albrecht immediately declared war against him, and invested Tabor, but was forced by P. to raise the siege, and retire to Prague. From this time P.'s influence was firmly established among the Utraquists; next to Lipa, he was the first man of the party. When Albrecht died (1439) Lipa was appointed regent during the minority of the new king Ladislas; but five years later Lipa died, and P. obtained the government of the country. He, however, was ambitious for the royal dignity In 1449 he one night seized the capital, drove away all the Rom Cath. barons, and even imprisoned his colleague in the regency, Meinhardt von Neuhaus. This outrage led to a year or so's fighting—the final result of which was that P. was acknowledged gov. or regent by the whole of Bohemia. On the death of Ladislas 1457, P. managed to be chosen his successor, and was crowned 1458, May 7. From this period he began to show the full power of his administrative genius. He reorganized the forms of education and religion, and strove to bring about a peaceful settlement of the religous dissensions that had desolated the land. He even went the length of respectfully soliciting the papal co-operation in his humane endeavors; but the pope would have no dealings with this Samaritan ruler, and 1463, Dec., publicly proclaimed him a heretic. All the neighboring princes sent letters to Rome, exhorting or imploring the pope to moderation; but the only answer which Pius II. gave them

was placing P. under the ban of the Vatican. Shortly afterward Rudolf, the papal legate, excited the Rom. Catholics of Bohemia to insurrection. P. tried every means of conciliation, but in vain. 1466, Sep., a German Rom. Cath. army burst into Bohemia, but this host of pseudo-crusaders was annihilated at Riesenberg. Once more Pius excommunicated P., and in addition induced Mathias (q.v.) of Hungary to invade Moravia. The Bohemian king appealed to a universal council, but he also prepared to meet force with force. Summoning back from abroad the banished Taborite warriors, he crushed the insurrection, and compelled his enemies to grant him an advantageous armistice. In 1467 his son Victorin, on the renewal of hostilities, invaded and devastated Austria, while the Hungarians who had invaded Bohemia were surrounded at Vilemov, and forced to cease from hostilities. In spite of the magnanimity shown by P. on this occasion, Mathias acted falsely toward him; and in the following year had himself crowned King of Bohemia and Markgraf of Moravia. P., instantly summoned the Bohemian diet and proposed to the assembled orders that they should take the king of Poland as his successor, while his own sons should merely retain the family possessions. By this means he obtained the Poles for allies; Emperor Friedrich also declared in his favor, while his Rom. Cath. subjects were reconciled to him, so that the Hungarians found it advisable to conclude a peace. After his death his sons, Victorin and Henry of Münsterberg, fell back into the ranks of the Bohemian aristocracy; but in the stormy days that followed they rendered good service to their native land.

PODIUM, n. *pō'dĭ-ŭm* [L. *podĭŭm*, a balcony]: pedestal continued horizontally to form a low wall on which columns may be set. Like the pedestal, it has a lease, die, and corona, all continued. When the P. breaks forward so as to form a pedestal for a column, it is called the Stylobate.

PODO-, prefix, *pŏd-o-* [Gr. *pous*, *podos*, a foot]: belonging to, connected with, or situated on or near the foot.

PODOCARP, n. *pŏd'ō-kârp* [Gr. *pous* or *poda*, a foot; *karpos*, fruit]: in *bot.*, the stem supporting the fruit.

PODOCARPUS, *pŏd-o-kâr'pŭs:* genus of trees of nat. order *Coniferæ*, sub-order *Taxineæ*, the order *Taxaceæ* of some botanists. The leaves, like those of the allied Gingko tree, have remarkable resemblance to the fronds of ferns. The species are natives of New Zealand, the South Sea Islands, and the Indian archipelago. Some are valuable timber trees. *P. cupressina*, one of the best timber trees of Java, found also throughout the neighboring islands and the South Sea Islands is a beautiful tree, 50 to 80 ft. high, with spreading pendulous branches; the wood is yellowish, and takes a very fine polish. *P. totarra*, the TOTARRA, or TOTARRA PINE, the most valuable timber tree of New Zealand, grows in the s. parts of New Zealand, and its trunk has been known to attain a diameter of 12 ft. Its wood is equal to the best Baltic pine in durability and for ship-building.

The wood of *P. elatus*, the GAGALI of the Fijians, is peculiarly elastic.

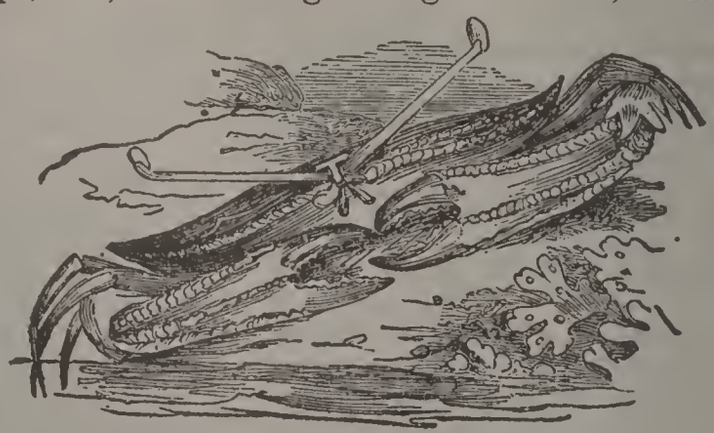
PODOCEPHALOUS, a. *pŏd'ō-sĕf'ă-lŭs* [Gr. *pous* or *poda*, a foot; *kephălē*, the head]: in *bot.*, having a head of flowers elevated on a long peduncle.

PODOGYNE, n. *pŏd'ō-jĭn*, or PODOGYNIUM, n. *pŏd'ō-jĭn'-ĭ-ŭm* [Gr. *pous* or *poda*, a foot; *gŭnē*, a woman]: in *bot.*, a fleshy and solid projection which serves to support the ovary, with which it is continuous.

PODOLIA, *pō-dō'lĭ-a*, or KAMINETZ, *kâ'mē-nĕts:* government of West or 'White' Russia, n. of Bessarabia, and bordering on the Austrian frontier; 16,170 sq. m. The surface is a table-land, strewn with hills, and containing many beautiful districts. Nearly three-fourths of P. is either arable or available for pasturage. Great quantities of corn and fruits, especially melons, are produced, and the fine climate is favorable to the growth of the vine and mulberry. Hemp, flax, and tobacco are cultivated with success, and the rearing of bees is an important industry. So rich and strong is the grass in the pastures or prairies, that the immense heads of cattle can hide themselves from view in it. The population is composed of various races, who live together unmixed. The Russniaks (formerly 'serfs') make up the majority, and number over a million; next come the Cossacks; and then the Jews, who almost all are traders. The aristocracy are Poles; the officials and soldiery, Russians. Pop. (1890) 2,604,800; (1897) 3,031,513.

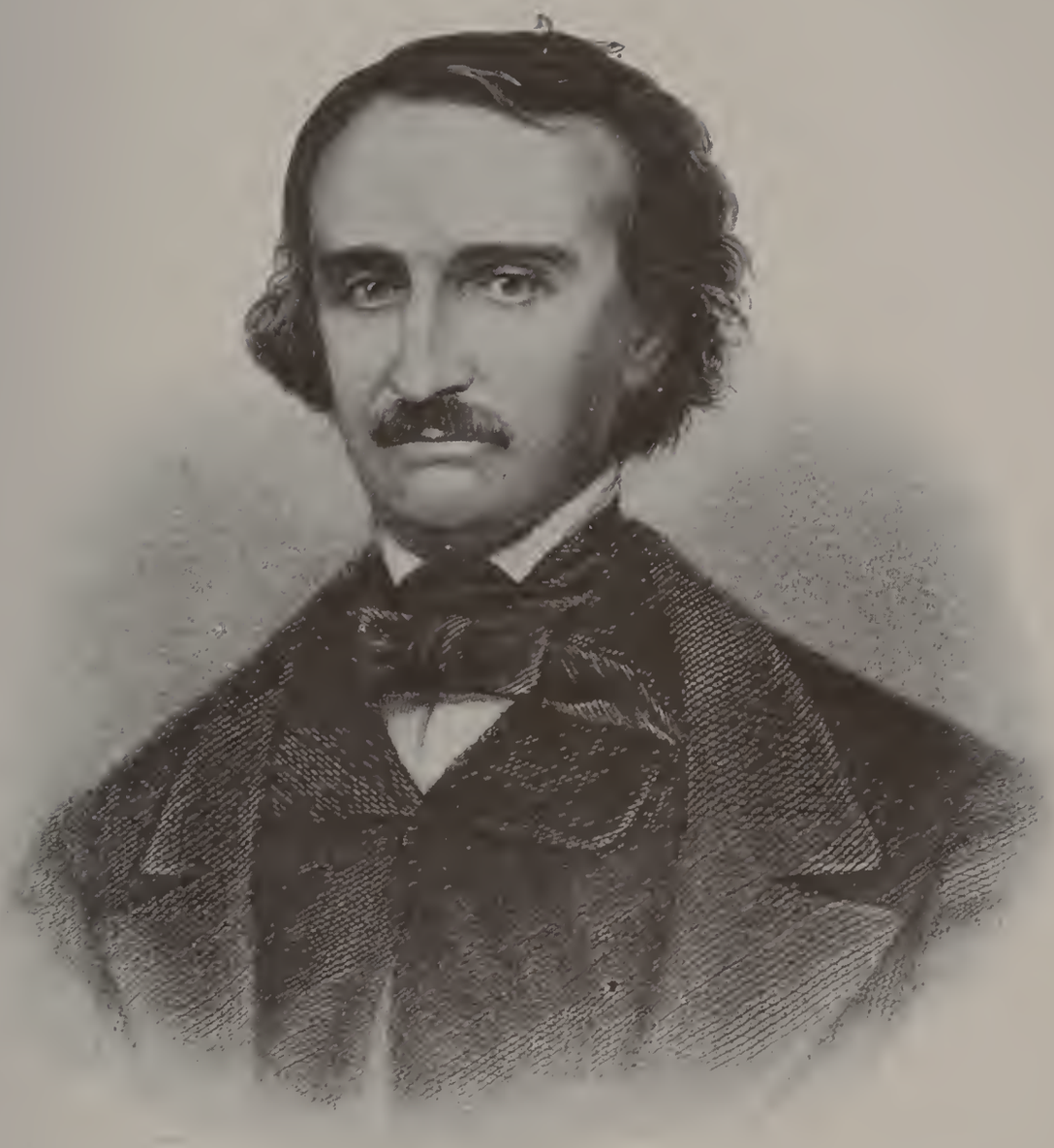
PODOLOGY, n. *pŏ-dŏl'o-jĭ* [prefix, *podo-;* Gr. *logos*, a word, a discourse]: treatise on or description of the foot.

PODOPHTHALMA, n. plu. *pōd'ŏf-thăl'mă*, or PODOPHTHALMATA, or PODOPHTHALMIA [Gr. *pous* or *poda*, a foot; *ophthal'mos*, the eye]: division of malacostracous crustacea, part of the *Malacostraca* of Cuvier, including the orders *Decapoda* (Crabs, Lobsters, etc.) and *Stomapoda* (Shrimps, etc.). A distinguishing character, from which



Sentinel Crab.

they derive their name, is their stalked and movable eyes. The stalks of the eyes are short in many, but very long in some, of which a beautiful example is presented by the Sentinel Crab of the Indian Ocean.—P. in *conch.* is a division of vostriferous gasteropods with eyes at the ends of cylindric peduncles.



EDGAR ALLAN POE.

PODOPHYLLIN, n. *pŏd'ō-fĭl'lĭn* [Gr. *pous* or *poda*, a foot; *phullon*, a leaf]: resin obtained by means of rectified spirit from the root of *Podophyllum peltatum*, or *May-apple*, a plant common throughout the United States. This resin, a pale greenish amorphous powder, is an active purgative, and seems to have the power of relieving the liver by exciting copious bilious discharges. As its activity seems to vary in different patients, it is better to begin with a small dose of half a grain, which may be combined with something to prevent its griping. POD'OPHYL'LOUS, a. *-fĭl'lŭs*, in *entom.*, having the feet or locomotive organs compressed into the form of leaves.

PODOPHYLLUM, *pŏd-ō-fĭl'lŭm:* genus of plants variously ranked by botanists in the nat. order *Ranunculaceæ*, or made the type of a small distinct order, *Podophylleæ* or *Podophyllaceæ*, differing from *Ranunculaceæ* chiefly in having a solitary carpel. The genus P. has 3 sepals, 6 to 9 petals, 12 to 18 stamens, a broad round stigma, seated almost on the top of the germen, and a many-seeded berry. *P. peltatum* is a perennial, with a solitary white flower in the axil of the two leaves; the fruit oval, an inch and a half long, smooth, yellowish, succulent, having a mawkish sweet and subacid taste. It is common in N. America, growing in moist woods and on the shady banks of streams, and is known as MAY-APPLE, because it flowers and ripens its fruit very early in summer; it is called also *Hog-apple* and *Wild Lemon*. The fruit may be eaten, but is not agreeable. All the other parts are actively cathartic: see PODOPHYLLIN.

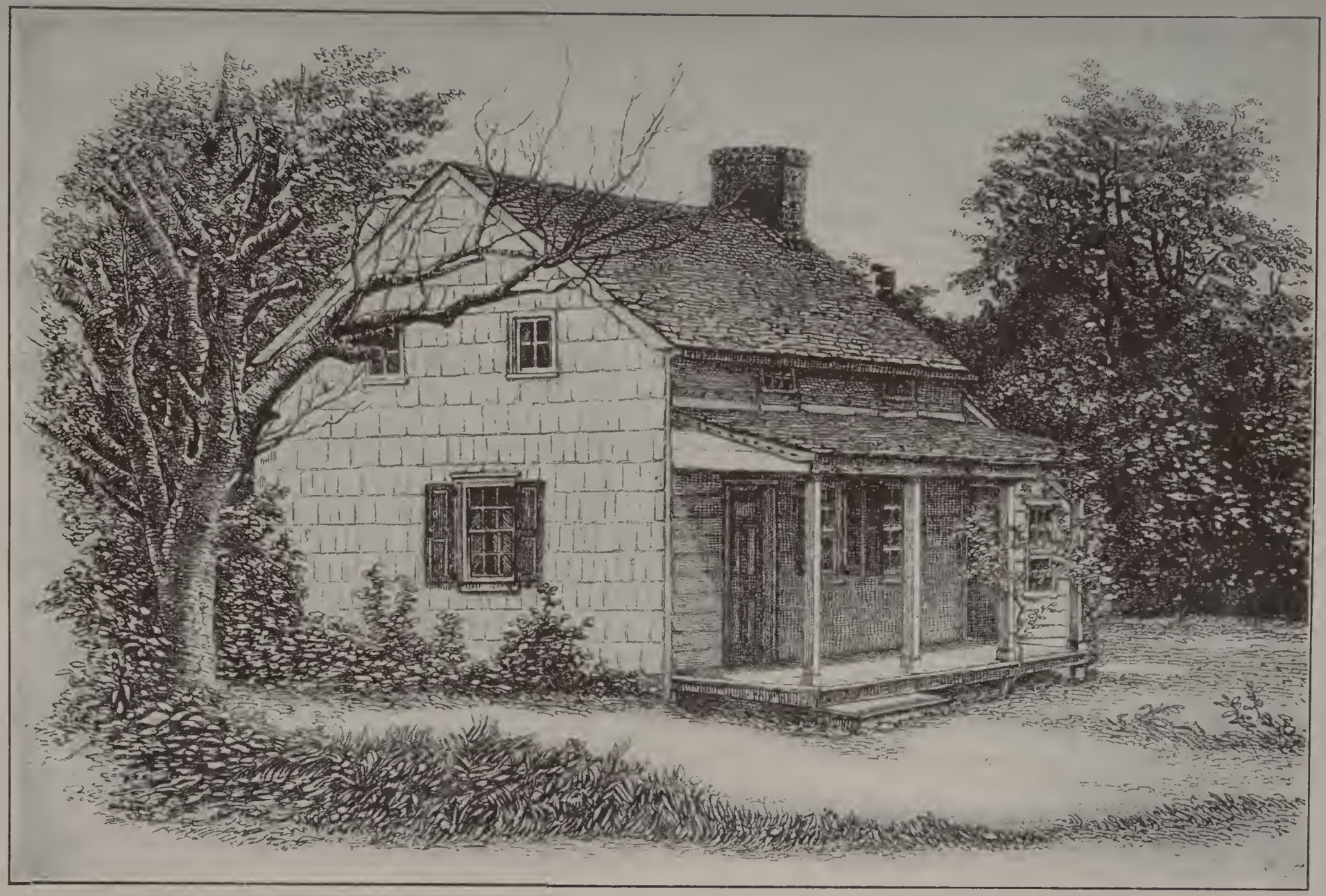
PODOSPERM, n. *pŏd'ō-spĕrm* [Gr. *pous* or *poda*, a foot; *sperma*, seed]: the filament or thread by which the ovule adheres to the placenta.

PODURA, *pō-dū'râ:* genus of small wingless insects of order *Thysanoura* (q.v.), having a linear or cylindrical body, a distinctly articulated thorax, rather long antennæ, and a long abdomen, terminating in a tail, which divides at its extremity into two branches. They bend the tail beneath the abdomen, and by suddedly extending it, make prodigious leaps. Hence their popular name, SPRING-TAIL. The species of this and allied genera are numerous; some are found on plants, some under stones and in other damp places, some on the surface of stagnant waters. Their bodies are covered with scales, which are very interesting, and are among the favorite test-objects for the powers of microscopes.

Podura villosa.

POE, *pō*, EDGAR ALLAN: perhaps the most original poetical genius yet produced by America: 1809, Feb. 19—1849, Oct. 7; b. Boston. His father, son of Gen. Poe, a distinguished officer in the revolutionary army, was educated for the law, but, falling in love with a beautiful English actress, he married her and went upon the stage. In a few years the youthful couple died at nearly the same time of consumption, leaving three children entirely unprovided

for. Edgar, the second child, was adopted by John Allan, a rich childless merchant. In 1816 the boy went to England with Mr. and Mrs. Allan, and was sent to a school at Stoke Newington. In 1821 he returned to America, and attended an academy at Richmond, Va. In 1826 he entered the Univ. of Charlottesville, where he was a very successful student, but quitted it at the end of a year, deeply in debt, chiefly through his passion for gaming. For a year or two he remained quietly at home: the story of his having gone to assist the Greeks in their heroic efforts to throw off the yoke of their Turkish oppressors has no other foundation than the fact that his elder brother, who had gone to sea, fell into some trouble with the police at St. Petersburg, from which he was rescued by the U. S. minister. In 1829 Poe published a volume of poems, his first known essay in literature, under the title *Al Aaraaf, Tamerlane,* and other poems. He then expressed a wish to enter the army, and Mr. Allan exercised his influence to secure him a cadetship in the Milit. Acad. at West Point. Here he grossly neglected his duties, drank to excess, and was finally cashiered, 1831, Mar. 6. In the same year he published an enlarged collection of his poems, dedicated to the U. S. Corps of Cadets. Returning to Richmond, Poe was kindly received by Mr. Allan, who had become a widower and married a second wife. It is related that Poe's conduct to this lady was such that Mr. Allan had to eject him from his house, but there is some reason for deeming this a calumny. It is certain, however, that Mr. Allan had some strong reason for displeasure with Poe, and at his death 1834, he left him unmentioned in his will. Thus thrown upon his own resources, Poe turned to literature as a profession. In 1833 the publisher of a Baltimore magazine having offered prizes for the best prose story and the best poem, Poe competed, and won both prizes. This led to his friendship with John P. Kennedy, one of the prize committee, who procured him literary employment in connection with the *Southern Literary Messenger* at Richmond. While here, Poe married his cousin, Virginia Clemm, a beautiful and saintly creature, as destitute as himself, who died 1848. He was tenderly attached to her; and her years of illness, with their necessarily large drain of his scanty resources and their constant heavy burden on his heart, may have increased his natural morbidness. In 1837 he removed to New York, where he lived by contributing to the *New York Quarterly Review* and other periodicals, and where 1838 he published *The Narrative of Arthur Gordon Pym.* In 1839 he became editor of *The Gentleman's Magazine* at Philadelphia, and published a collection of his best stories with the title, *Tales of the Arabesque and Grotesque.* The next few years were spent in similar literary employment, chiefly at New York; the year 1845 being marked by the appearance of his famous poem, *The Raven* (for which, as is recorded, he received ten dollars); and 1848, by the publication of *Eureka, a Prose Poem,* in which he endeavored to elaborate a system of cosmogony. In 1849 he went to Richmond, and it is said became engaged



HOME OF E. A. POE, FORDHAM, N. Y., IN 1852.

to a lady of wealth. Oct. 4 he left Richmond by train, which he quitted at Baltimore. Some hours later he was discovered insensible in the streets, and taken to the hospital, where he died. The ordinary explanation of his condition at Baltimore is that he had met some old associates and drunk himself into helpless intoxication.

Few careers so dark and disastrous as that of Poe have place in all the sad records of genius. There is no doubt that Griswold in his life of Poe has been guilty of imputing to him a most exaggerated moral depravity; but the fact remains that the failure of his life was mainly occasioned by his habits of frantic dissipation. There was about Poe a strange fascination; his friends loved him—those best who best knew him, and knew him in his wretchedest aberrations. By his wife and her mother he was regarded through all with an obstinacy of tender affection, not for an instant to be shaken.

Whatever may be thought of his morals, of his genius there is little question. In his poetry, slight in substance as for the most part it is, small in quantity, and limited in range, there is that which ranks it above everything of this kind which his country has produced. Except for some traces of imitation in its earlier specimens, his verse is eminently a peculiar and individual product. In keen, clear, lyrical quality, the music of Poe at his best is scarcely surpassed by that of any other poet. Many of his short prose tales are wildly and weirdly impressive, though too frequently indulging by morbid preference in ghastly and painful effects. Over very much that he has written, alike in prose and in verse, there broods a significant shadow of misery and hopeless portentous gloom. A much more favorable view than usual of P.'s character is taken by Ingram in the memoir accompanying his ed. of Poe's works (4 vols., Edin. 1874); as also in his separate biography, *Edgar Allan Poe, his Life, Letters, and Opinions* (1880). Stoddard prefixed a memoir to a collection of his poems (1875).

POE, Orlando Metcalfe: b. Navarre, Stark co., O., 1832, March 7: soldier. He graduated at West Point 1856, and was assigned to the engineer corps. He was attached to the survey of the lakes when the civil war began. As col. of the 2d Mich. volunteers he took part in the Virginia peninsular campaign; was commissioned brig.gen. of volunteers, 1862, and commanded a division 1863; became captain of engineers 1863, March; was with Sherman as chief of engineers in the march to the sea. He received successively the brevets of maj., lieut.col., col., brig.gen., and maj.gen. in the regular army, and 1891 holds the actual rank of col. of engineers. He d. 1895, Oct. 2.

PO'E BIRD: see Honey-eater.

PŒCILOPOD, n. *pē-sĭl'ō-pŏd* [Gr. *poikĭlos*, variegated; *pous* or *poda*, a foot]: a crustacean having various kinds of feet—applied to the king-crabs.

POEM, n. *pō'ĕm* [F. *poëme*—from L. *poëma;* Gr. *poiēma*, a composition in verse; *poiētēs*, a poet—from *poiĕō*, I make: comp. O.Scot. *maker*, a poet]: a composition in verse; the literary production of a poet (see POETRY). POESY, n. *pō'ĕ-sĭ*, poetry; metrical composition; the art of composing poems; a short conceit engraved on a ring—also spelled POSY, n. *pō'zĭ*. POET, n. *pō'ĕt*, the author of a poem; one who has the gift of writing poetry. POETESS, n. fem. *pō'ĕt-ĕs*, a women gifted with poetic genius. POET LAUREATE, n. *law'rĕ-āt* [L. *laurĕātus*, crowned with laurel—from *laurĕa*, the laurel-tree]: in *Britain*, a salaried officer of the royal household, formerly required to write an ode on the king's birthday or other special occasion—the office is now conferred on an eminent poet (see LAUREATE). POET-MUSICIAN, an ancient bard and lyrist. POETASTER, n. *pō'ĕt-ăs'tĕr* [It. *poetastro*, a poetaster]: a petty poet; a pitiful rhymer; a rhymster. POETIC, a. *pō-ĕt'ĭk*, or POET'ICAL, a. *-ĭ-kăl*, relating to poetry; expressed in poetry; marked by poetic language or imagery; figurative; imaginative. POET'ICALLY, ad. *-lĭ*. POETICS, n. plu. *pō-ĕt'ĭks*, the branch of criticism relating to poetry. POETIZE, v. *pō'ĕt-īz*, to make verse; to compose verse, as a poet. PO'ETIZING, imp. PO'ETIZED, pp. *-īzd*. POETRY, n. *pō'ĕt-rĭ*, embodiment of thoughts and emotions in a measured musical flow of words; striking thoughts, picturesque situations, and generally the full play of the imagination expressed in metrical compositions; prose composition expressed in the vivid language of the imagination and of the feelings; verse; rhyme; metrical compositions (see below). POETICAL JUSTICE, that ideal justice which poets and novelists mete out, making the good and innocently unfortunate, finally happy, and consigning the evil and the bad to condign punishments.

POEPHAGA, n. *pō-ĕf'ă-gă* [Gr. *poa*, grass, herbage; *phagein*, to eat]: in *zool.*, a group of the marsupials. PO-EPH'AGOUS, a. *-ă-gŭs*, eating grass.

POERIO, *po-ā'rē-o*, CARLO: Italian patriot: 1803, Dec. 10—1867, Apr.; son of Giuseppe P., Baron Belcastro, distinguished for love of liberty and for sufferings in her cause. The father, the Baron (1775–1843, b. Belcastro in Calabria), took part in the Neapolitan revolution of 1799, and suffered inprisonment; and for his part in the revolution of 1820, Ferdinand handed him over to the Austrians: from this exile he returned 1833 to Naples. He left two sons, the elder, Alessandro P. (1802–48), poet and patriot; and Carlo, the subject of our notice. Carlo was educated with great care, and trained to patriotism even from infancy. In 1828 he joined the liberals of Naples in the conspiracy of Avellino, for which he was imprisoned till 1838. He was concerned in the movement of 1847, and was sent back to prison, from which he was freed by the revolution in Sicily 1848. Into the work for producing the new constitution of 1848, Feb. 10, he threw himself with fervor; and was offered high official positions, which he declined.

1849, July 18, a conspiracy of the govt. for his ruin was

set at work through a letter forged by the police, and purporting to come from Marquis Dragonnetti. This letter referred to an invasion planned by Garibaldi, instigated by Mazzini and by Lord Palmerston of England. When this letter was proved a forgery, and when other accusations fell to the ground, some revolutionists were influenced by the govt., under threat of death, to accuse P. of complicity in their plans; and after a mockery of trial he was condemned to 24 years in irons and a heavy fine. Thus this man of rare genius and exemplary life was cast into the hulks at Nisida, dressed as a felon, and dragging 15 lbs. of chains with assassins and thieves as companions. To humble him, it was proposed to him to try the effect of a petition for his liberty: he indignantly spurned the proposal. At last the protests of the English and French diplomatists and the letters of Gladstone, with the dread of a popular rising, brought Ferdinand II. to a resolve to rid himself of his political prisoners by sending them to America, 1859. P. and 66 others were put on board an Amer. vessel, whose capt., however, was induced to land them at Cork, whence they returned, by London, to Turin. In the following year P. was elected deputy by two colleges in Tuscany, and took his seat in parliament. When Garibaldi (q.v.) had driven out the Bourbon dynasty, P. returned to Naples. He declined the ministerial office offered him by Cavour, also the governorship of the southern provinces, but accepted the office of privy councilor.

PO'ETRY: according to the mere etymology of the word, a creation or production of any kind; but its classical equivalent, *poiēsis*, was applied by the Greeks almost exclusively to the artistic productions of the imagination, expressed in language. Poetry is thus not necessarily associated with verse or rhyme. It may find expression in prose, and has often done so in ancient and modern times. The Book of Ruth, e.g., is decidedly poetical in substance, yet in form it is strictly prosaic. Similar is the case with the Book of Job and the Prophetical Writings, in the English version. Jeremy Taylor, Hooker, Rousseau, Burke, Carlyle, Ruskin, Hawthorne, Emerson, and other modern prose writers, are often as richly or profoundly imaginative as poets by profession; but though the essence of poetry lies rather in the nature and adornment of the thoughts expressed than in the form of the composition, yet in general it has subjected itself to certain rules of *metre* or measure, often also to rules of *rhyme*. The reason of this practice lies in the fact that the music so produced by the mere words is found to heighten the emotions which their meaning is calculated to produce. Hence P. has become almost synonymous with metrical composition. Poetical compositions are of several classes, to which particular terms are applicable: the principal are the Epic (q.v.), the Lyric (q.v.), and the Drama (q.v.). To the Epic belongs the Ballad (q.v.): to the Lyric belongs the Song (q.v.) in all its varieties, serious and comic, the Hymn (q.v.), Ode (q.v.), Anthem (q.v.), Elegy (q.v.), Sonnet (q.v.), etc.: to the Drama belong Tragedy and Comedy. Besides these three principal

kinds, are others of less consequence, e.g., Didactic Poetry (q.v.), Satirical Poetry (see SATIRE), in which, however, imaginative and ideal elements in general mingle so sparingly that strict critics exclude it from the circle of poetry. The theory of P., or Poetics (a branch of Æsthetics, q.v.), has been largely discussed in every cultivated language. Histories of the P. of the several nations are numerous: Rosenkranz and Zimmermann have produced universal histories of poetry.

POGGE, *pŏg* (*Aspidophorus Europæus*): fish of family *Sclerogenidæ*, or *Mailed Cheeks*, and nearly allied to the Bullhead (q.v.); but having the body cuirassed with large bony scales from the head to the tail fin, so that it is in form nearly a pyramid with eight faces. Its length seldom exceeds 6 inches. The head is thicker than the body, with points and depressions, the snout furnished with short recurved spines. The P. is known on the coasts of England as the *Armed Bullhead;* and on the coasts of Scotland by the names *Lyrie*, *Pluck*, and *Noble*. Notwithstanding its uncouth appearance, its flesh is good.

POGGENDORFF, *pŏg'gĕn-dorf*, JOHANN-CHRISTIAN: German physicist: 1796, Dec. 29—1877, Jan. 24; b. Hamburg. He studied pharmacy, chemistry, and physics; and was prof. of physics at Berlin from 1834 till his death. In 1838 he became a member of the Acad. of Sciences. His chief discoveries were in connection with electricity and galvanism, and these are reckoned of great value; he also invented a multiplying galvanometer for measuring the calorific action of currents. From 1824 onward he edited the *Annalen der Physik und Chimie*, contributing to this collection many important memoirs. He was one of the triad (Liebig and Wöhler being the other two) who prepared the *Dictionnaire de Chimie* (Brunswick 1837–51). The two works published by himself are the *Linien zu einer Geschichte der exacten Wissenschaften* (Berlin 1853), and *Biographisch-litterarisches Wörterbuch zur Geschichte der exacten Wissenschaften* (Leip. 1858–63, 2 vols.)—invaluable as a collection of facts concerning the lives and work of scientific men of all lands and times, a basis indeed for the history of physical science.—As a physicist, P. was lacking in mathematical ability, and was not distinguished for power in scientific generalization; but in experiment he was most able and thorough, and in invention of scientific apparatus, he had great ingenuity. His manners were unusually engaging.

POGON, n. *pō'gŏn* [Gr. *pōgōn*, the beard]: in *bot.*, the beard.

POGONIAS, *pō-gō'nĭ-ăs:* genus of acanthopterous fishes, of family *Sciænidæ*, having two dorsal fins, one of them deeply notched, and many small barbels under the mouth. The fishes of this genus are found on the coast of warm countries; and are remarkable for emitting sounds somewhat resembling those of a drum, which have obtained for them the name DRUMFISH. The production of the sounds appears to depend on action of the air-bladder. Sailors in vessels anchored near the shore, where species of this genus abound, are often prevented from sleeping, until they have become habituated to them. Some of the species attain large size, weighing 100 lbs. or more. The N. Amer. species is *P. chromis*, attaining 80 lbs., most abundant on the s. Atlantic and Gulf coast, though taken as far north as Cape Cod; it is at times very destructive to oyster beds. The young are different in color, being banded with brown and white, and until recently were mistaken for a distinct species, and named *P. fasciatus*. The Fresh-water Drum, Croaker, or Sheepshead, of the Great Lakes and w. rivers, is of another genus.

POH! int. *pō:* an exclamation of contempt.

POIGNANT, a. *poy'nănt* [F. *poignant*, poignant—from F. *poindre*, to pierce or sting: L. *pungĕrĕ*, to puncture, to pierce into]: very painful or acute, as pain or anguish; severe; piercing; keen; irritating; pungent; sharp; satirical. POIGN'ANTLY, ad. *-lĭ*. POIGNANCY, n. *poy'năn-sĭ*, the state of being poignant.

POINDEXTER, *poyn'dĕks-tĕr*, GEORGE: 1779–1853, Sep. 5; b. Louisa co., Va.: statesman. He began the practice of law in Milton, Va.; removed to Miss. 1802; was atty.gen. of that territory 1803, and as such appeared for the prosecution when Aaron Burr was arrested in his first descent on New Orleans. He was a member of the territorial assembly 1805, delegate to congress 1807–13, U. S. judge of the Miss. district 1813. He was volunteer aid to Gen. Jackson in the battle of New Orleans. When Miss. became a state, he was its first representative in congress; there he was a zealous defender of Gen. Jackson. While in congress he revised the laws of Miss., and the code was pub. 1824. He returned to his law practice 1821, but 1830 was elected U. S. senator, and served till 1835. From being friends Pres. Jackson and P. became bitter enemies, and P. was even charged with complicity in an attack on the life of the pres. His public career ended 1835.

POINDING, n. *poyn'dĭng* or *pĭn'dĭng* [AS. *pyndan*, to shut up; *pund*, an inclosure: Ger. *pfänden*, to seize, to distrain]: in *Scotch law*, a process by which the property of the debtor's movables is transferred to the creditor: in *England*, the equivalent term is *distraining* or *distress*. POIND, v. *pĭnd*, to seize under legal process for debt; to distrain.

POINSETT, *poyn'sĕt*, Joel Roberts: 1779, March 2—1851, Dec. 12; b. Charleston, S. C.: statesman. He was liberally educated, studied medicine in Edinburgh and milit. science at Woolwich. Afterward he travelled through Europe, and on his return home was sent to S. America to observe the struggle of the Spanish colonies for independence. While P. was in Chili, the Spanish authorities in Peru, on a rumor of war between the United States and Spain, seized several American ships; P. headed a force of Chilians, attacked the Spaniards, and recaptured the ships. On his return home he was elected to the legislature of S. C.; served in congress 1821–25; and was U. S. minister to Mexico 1825–29. He was the leader of the Union party in S. C. in opposing nullification; afterward was sec. of war in Van Buren's administration—his last public office. P. earnestly opposed the Mexican war.

POINT, n. *poynt* [F. *point*, a point, a dot; L. *punctum*, a small hole, a puncture—from *pungĕrĕ*, to prick]: the sharp end of any instrument or body; anything resembling a point; the sting of an epigram; a small cape or headland; a turn of thought or expression that strikes with agreeable surprise; in *geom.*, that which has position but no magnitude; a moment; a small space; punctilio; nicety; place or time near; critical moment; eve or verge, as of death: position; state; dot, mark, or spot; direction of view, or part viewed; particular mark or aim; particular mode or parts; instance; example; single part; part of a whole; single position; the main question; lace wrought with the needle, as point-lace; a division of the mariner's compass; in *OE.*, note; time; a tagged lace, used in dress: V. to bring to a sharp end; to direct toward; to aim; to show distinctly; to show by way of example; to mark with characters in order to indicate certain distinctions; to distinguish by stops or points by way of punctuation; to fill the joints with mortar and smooth them with a trowel, as a stone wall; to direct attention to an object by the finger; to indicate, as dogs do to sportsmen. Point'ing, imp.: N. punctuation; the act or operation of filling the crevices of walls with mortar; the materials so employed. Point'ed, pp. aimed at any particular person or thing: Adj. having a sharp end; keen; smart, as a rebuke; in *arch.*, having arches sharply pointed. Point'edly, ad. *-lĭ*, in a marked or particular manner. Point'edness, n. *-nĕs*, the state of being pointed; sharpness; keenness. Point'er, n. *-ẽr*, anything that points; hand of a timepiece: variety of sporting-dog employed to point out the game (see below). Point'less, a. *-lĕs*, without any sharpness at the termination, or keenness; aimless. Point'ers, n. plu. *-ẽrz*, the two bright stars of the Great Bear which serve to point out the pole-star, a line drawn through them and prolonged nearly indicating it. Points, among *seamen*, flat pieces of plaited cordage tapering toward each end used in reefing; on a *railway* (British usage), the switches or movable guiding-rails which admit a train on to a junction-line, to a siding, or from the one line of rail to the other; qualities, as

good points. POINTSMAN, n *poynts'măn*, on a *railway* (British), a workman who has charge of the switches or movable guiding-rails at or near a junction or station, to open or shut them on the approach of trains, as may be required. POINT-WORK, work done with a needle or small-pointed instrument. POINT OF SIGHT, in *perspective*, the point which is supposed to be exactly opposite the eye. POINTS OF THE COMPASS, the points of the circumference of the compass card, which is divided into 32 equal parts or points—the circumference being 360 degrees, each point will be 11° 15′. CARDINAL POINTS, north, south, east, and west. POINT D'APPUI, *p'wâng-dăp'û-ē* [F. *point*, point; *de*, of; *appui*, prop or support]: in *mil.*, point of support; base of operations. POINT DEVICE, or DEVISE (often preceded by *at*), *poynt'dĕ-vīs'* or *p'wâng'dĕ-vēz'* [OF. *à point devis*, in the best way imaginable—from *deviser*, to distribute, regulate: L. *dividĕrĕ*, to divide]: particular sort of lace worked with a point or needle; condition of ideal excellence: term denoting anything uncommonly nice and exact. POINT OF INCIDENCE, the point on the surface of a body on which a ray of light falls. POINT OF REFLECTION, the point from which a ray is reflected. POINT-BLANK, a. in *mil.*, direct, —applied to the position of a gun or rifle aimed at an object without any elevation—the distance, which is more or less short, is called *point-blank range* (see GUNNERY): AD. directly. POINT OF A HORSE, in *mining*, the spot where the vein is divided into one or more branches. VANISHING-POINT, in *perspective*, the spot to which all parallel lines in the same plane tend in the representation. POINT OF CONTACT, in *geom.*, the point in which a straight line touches a circle or curve. POINTS OF A HORSE, those properties of shape, symmetry, etc., upon which much of the value of a horse depends. POINT OF VIEW, aspect; mode of looking at. TO POINT OUT, to show, as by the finger. TO POINT AT, to treat with scorn by directing attention to, as with the finger. AT POINT, or ON THE POINT, as near as can be; on the verge IN GOOD POINT, in good condition. TO STAND ON POINTS, to hesitate as to the propriety or delicacy of an act. NINE POINTS OF THE LAW, the greater chance of success in a suit at law, as possession is *nine points of the law*. TO MAKE OR GAIN A POINT, to accomplish a certain part of that which was proposed; to make advance by a step. TO MARK OR SCORE A POINT, in *billiards* and in *common usage*, to accomplish or note down successful hits, etc. TO STRAIN OR STRETCH A POINT, to go beyond the proper limit; to exceed the bounds of strict propriety, or of duty—probably alluding to the points or tagged laces of olden costumes. VOWEL-POINTS, in certain eastern languages, as the Hebrew, a system of marks placed above or below the consonants to indicate vocal sounds and their character.—SYN. of 'point, n.': end; headland; promontory; part; moment; space; punctilio; nicety; degree; state; stop; spot; particular; aim; instance; condition.

POINT, *poynt*, in Heraldry: triangular figure issuing from the dexter and sinister base of the shield. A shield charged with a point is in heraldic drawing hardly distinguishable from one parted per chevron.

Point.

POINT-À-PITRE, *pwâng-tâ-pēt'r:* town of the French W. India island Guadeloupe, cap. of the division of Grande-Terre, on the Little Cul-de-Sac, 20 m. n.e. of Basse-Terre. The town is well built, and has a safe and spacious harbor. It is the centre of the commerce of the colony. Pop. (1901) 18,942.

POINT DE GALLE, *pwâng dė găl':* fortified town and seaport on the s.w. extremity of the island of Ceylon, on a low, rocky promontory of the same name; lat. 6° 1′ n., long. 80° 12′ e. The harbor, a small bay with entrance about a mile in width, is good, though there are numerous rocks, and a pilot is required to conduct vessels to the anchorage. Among principal edifices are the fort—a mile in circumference—the old Dutch church, a Rom. Cath. chapel, an excellent orphan asylum, barracks, and light-house 103 ft. above sea-level. This town has become important in recent years, especially since the organization of the Peninsular and Oriental Steam-navigation Company. Vessels plying between Suez and Bombay and Calcutta, Australia, China, Penang, and Singapore, call here to coal and to tranship passengers. It is the seat of govt. of the s. province of the colony of Ceylon. Gold and silver ornaments, work boxes, etc., are made with great taste and nicety by the native workmen. Pop. (1891) 33,505; (1901) 37,316.

POINTED ARCHITECTURE: see GOTHIC ARCHITECTURE.

POINTE LEVI: see LÉVIS.

POINTER: kind of dog nearly allied to the true hounds (q.v.), but not reckoned one of them; remarkable for its habit of *pointing* at game; its whole body, particularly its head, indicating the position of the game to the sportsman. A well-trained P. will remain long immovable in the attitude of pointing, not going forward to disturb the game which its exquisite power of scent has enabled it to discover. It is recorded of two British pointers that they stood an hour and a quarter without moving, while Gilpin painted them in the act. The P., when he scents game, stops so suddenly and completely, that even the fore-foot, already lifted, remains suspended in the air. Without the P., the sportsman would have comparatively little success in pursuit of grouse; but the dog performs for him the laborious task of 'beating' the wide moors. Well-trained pointers will scarcely point at anything except 'game'; but inferior dogs often point at almost any living creature the odor of which affects their nostrils. The habit of pointing once acquired appears to become hereditary, so that very young pointers often exhibit it in great perfection. It has been explained, with the crouching of the setter, as 'the natural start of surprise or interest which all dogs give

when coming suddenly upon the scent or sight of their natural prey; modified by cultivation, and by transmission through many generations, each, by education, improving upon the capabilities of the former.'—See Bell's *British Quadrupeds.*

The breed of pointers now most common in Britain is believed to be crossed with the foxhound, to which there is considerable resemblance in colors as well as in form. The figure is very muscular, the hair short, the ears pendulous,

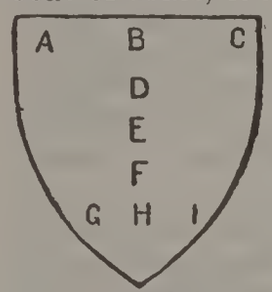
A Pointer standing at Game.

the upper lips moderately large, the tail pointed and destitute of brush. Dogs of this breed are very active, and capable of long-sustained exertion. The original breed, the *Spanish P*, probably brought to Spain from the East, is of more bulky form, less active habit, and less capability of continued exertion. The P. is very forward and familiar in its manners, but is both affectionate and intelligent, though it is reputed inferior in these respects to many other kinds of dogs.

POINT PLEAS'ANT, Battle of: fierce contest of about 1,100 militia of s.w. Va., under Gen. Andrew Lewis, with a large force of Shawnee, Delaware, and Mingo Indians, under the Shawnee chief, Cornstalk, 1774, Oct. 10, at a point near the junction of the Great Kanawha with the Ohio, now Point Pleasant, W. Va. The Scotch earl of Dunmore, acting as gov. of Va., had called out the militia of the s.w. part of Va., for defense of the frontier toward the Ohio, where both backwoodsmen and Indians were drifting into bloody war. Under such leaders as Isaac and Evan Shelby, Daniel Morgan, George Matthews, William Campbell, Andrew Moore, John Robertson, Valentine Sevier, Thomas Fleming, and Charles Lewis, with Andrew Lewis in command, a force was gathered at Camp Union, now Lewisburg, W. Va., and proceeded over the mountains to the Kanawha, whence, with a reinforcement, they descended that river in canoes, and encamped, Oct. 6, on the point at its mouth near the Ohio. Dunmore had gone to the Ohio with about 1,000 men, at Wheeling (W. Va.), ostensibly for co-operation with the troops from s.w. Va.

under Gen. Lewis, but actually more disposed to let those patriots and the savages slaughter each other, and clear the ground where he wished at once to secure wild lands and assert British against colonial authority. The Revolution was already practically begun, an act of the Brit. parliament had carried the bounds of Canada to the Ohio and Mississippi rivers; and Dunmore was particularly disposed to thwart the colony, and at the same time get access to the rich lands beyond the frontier. No message from him reached Gen. Lewis; and appearances tend to convict the earl of securing by his agents the concentration of the Indians against Lewis, while he delayed, and finally sent orders for Lewis to meet him 80 m. beyond the Ohio, on the banks of the Scioto. The victory, after one of the most hotly contested battles ever fought with Indians, was a disappointment to Dunmore and a triumph to the provincial army; and this darkly planned and desperately fought battle has been noted in that region as the first of the Revolution. The battle raged nearly all day, and would have ended as that of Braddock did, had not the backwoods experience and the skill and courage of the whites fully matched that of the savages. Cols. Charles Lewis, Fleming, and Field successively fell at the head of the main body, and nearly a fifth of the little army were either killed or wounded before the success of three companies, in an attack on Cornstalk's rear, decided the fortunes of the day, with greater loss to the savages than to the whites.

POINTS OF THE ESCUTCHEON, in Heraldry: divisions of the shield. In order to facilitate the description of a coat-of-arms, it is the practice to suppose the shield to be divided into nine points, which are known by the following names: A, the dexter chief point; B, the middle chief; C, the sinister chief; D, the collar or honor point; E, the fess point; F, the nombril, or navel point; G, the dexter base point; H, the middle base point; and I, the sinister base point. The dexter and sinister sides of the shield are so called, not in relation to the eye of the spectator, but from the right and left sides of the supposed bearer of the shield.



Points of the Escutcheon.

POISE, n. *poyz* [OF. *poiser; peser*, to weigh—from *poids*, weight: L. *pensārĕ, pendĕrĕ*, to weigh, weigh out]: a regulating power or weight; the weight used with steelyards; gravity; balance; that which balances: V, to make of equal weight; to balance; to load with a weight for balancing; to examine or ascertain, as by a balance. POIS'ING, imp. POISED, pp. *poyzd.*

POISON, n. *poy'zn* [F. *poison*, poison: L. *potio* or *potiōnem*, a drink—from *poto*, I drink: Sp. *ponzoña*, a venom, poison]: any substance which, when swallowed, inhaled, or rubbed over the skin, injures the health or destroys life (see POISONS): venom; anything which taints moral purity: V. to injure the health, or cause death, by administering poison; to infect with poison; to taint; to mar; to corrupt, as one's morals. POI'SONING, imp.: N. the act of giving poison to, or of injuring or killing by poison (see POISONING, SECRET). POISONED, pp. *poy'znd:* ADJ. infected or destroyed by poison. POI'SONER, n. *-zn-ẽr*, one who poisons or corrupts. POI'SONOUS, a. *-zn-ŭs*, containing poison; injurious to health; deadly; corrupting morals or purity. POI'SONOUSLY, ad. *-lĭ*. POI'SONOUSNESS, n. *-nĕs*, the quality of being fatal to life or injurious to health.—SYN. of 'poison, n.': venom; pest; bane; malignity; ruin.

POI'SONING, SECRET: mode of taking away life by poisons so slow in operation that the gradual sinking of the victims under their influence closely resembled the effects of disease or the ordinary decay of nature. It has been practiced in all ages, and several undoubted and numerous supposed instances of it are mentioned by Greek and Roman writers. In the 17th c. this atrocious practice became frequent, and rapidly increasing, spread over w. Europe like an epidemic, and became gradually a regular branch of education among those who professed a knowledge of chemistry, magic, or astrology. These persons regarded the knowledge of the mode of preparing secret poisons as of the highest importance, and many of them realized large sums by the sale of their preparations, and occasionally of the secret of their composition. Chiefly in Italy and France this art was practiced and perfected; but it seems to have had some prevalence in England also, for we find that, in the 21st year of Henry VIII.'s reign, an act was passed declaring the employment of secret poisons to be high treason, and sentencing those found guilty of it to be boiled to death. The only undoubted instance of this crime prominent in English history is the murder of Sir Thomas Overbury (q.v.) by Viscount Rochester (favorite minion of James VI.) and his wife, the divorced Countess of Essex; though many suppose, and with some probability, that James VI. himself was a victim to similar nefarious practices on the part of Villiers, Duke of Buckingham; and undoubtedly such was the popular impression at the time, for Dr. Lamb, a conjuror and quack, who was believed to have furnished Buckingham with the poisons, was seized by the angry populace in Wood Street, Cheapside, London, and beaten and stoned to death. In Italy this mode of poisoning seems from the writings of various authors to have been deemed justifiable for riddance of a rival or enemy; and from the time of the Lombard invasion to the 17th c., Italian history teems with instances showing that poison was both the favorite weapon of the oppressor, and the protection or revenge of the oppressed. The Borgias are generally singled out as poisoners, and held up to the horror and detestation of mankind; though as far as this method of

destroying their adversaries was concerned, they merely employed it a little more frequently than their neighbors. The popular feeling on this subject is instanced in the case mentioned in the memoirs of Henry II., fifth Duke of Guise, of a soldier who was requested to rid that duke of one of his opponents in Naples, Gennaro Annese. *Assassination* was the mode proposed to the soldier, but he shrank with horror from the suggestion, while stating that he was quite willing to *poison* Annese. It was shortly after the date of this story (1648) that secret poisoning became so frequent; and the Rom. Cath. clergy, despite the rules of the confessional, felt themselves bound to acquaint Pope Alexander VII. with the extent of the practice. On investigation, it was found that young widows were extraordinarily abundant in Rome, and that mos' of the unhappy marriages were speedily dissolved by the sickness and death of the husband; and further inquiries resulted in the discovery of a secret society of young matrons, which met at the house of an old hag, Hieronyma Spara, a reputed witch and fortune-teller, who supplied those of them who wished to resent the infidelities of their husbands, with a slow poison, clear, tasteless, and limpid, and of strength sufficient to destroy life in the course of a day, week, month, or a number of months, as the purchaser preferred. The ladies of Rome had been long acquainted with the 'wonderful elixir' compounded by La Spara; but they kept the secret so well, and made such effectual use of their knowledge, that it was only after several years, during which a large number of unsuspected victims had perished, and even then only through a cunning artifice of the police, that the proceedings were brought to light. La Spara and 13 of her companions were hanged, a large number of the culprits were whipped half-naked through the streets of Rome, and some of the highest rank suffered fines and banishment. About half a century afterward, the discovery was made of a similar organization at Naples, headed by an old woman of 70 years, named Toffania, who manufactured a poison similar to that of La Spara, and sold it extensively in Naples under the name of *acquetta*, and even sent it to all parts of Italy, under the name of 'Manna of St. Nicola of Bari,' giving it the same name as the renowned miraculous oil of St. Nicola, to elude discovery. This poison, now best known as the 'Acqua Tofana' or 'Acqua di Perugia,' is said by Hahnemann to have been compounded of arsenical neutral salts; while Gareli states that it was crystallized arsenic dissolved in a large quantity of water; but both agree that it produced its effect almost imperceptibly, by gradually weakening the appetite and respiratory organs. After having directly or indirectly caused the death of more than 600 persons, Toffania was at length seized, tried, and strangled 1719. From this time the mania for secret poisoning gradually died away in Italy.

About the middle of the 17th c. this horrible practice seems to have become prevalent in France, and under similar circumstances, the agents being married women, and their husbands the victims; and as in Italy, the extent to

which the practice was carried was made known first by the clergy. The government, acting on the information thus obtained, seized and imprisoned in the Bastille two Italians, Exili and Glaser, suspected of having been the manufacturers and vendors of the poisons. Glaser died in prison; but Exili, becoming acquainted with another prisoner named St. Croix, communicated to him his secret, which the latter made considerable use of after his release, compounding in particular the poison known as 'succession powder,' which subsequently became so celebrated. It was the same St. Croix who was prominent in the tragical history of the Marquise de Brinvilliers (q.v.). Penautier, treasurer of the province of Languedoc, and the Cardinal de Bonzy were pupils of St. Croix, and managed, the one to pave the way for his own advancement, and the other to rid himself of his numerous creditors, by poison; but the great influence of these men, and the want of direct evidence, barred all proceedings against them. Secret poisoning became fashionable; the passions of jealousy, revenge, avarice, and even petty spite, all were satisfied in the same way, and as a natural consequence other offenses decreased in proportion. The prisons teemed with suspected criminals, and the 'Chambre Ardente' was instituted for the special purpose of trying these offenders. In Paris this trade was in the hands chiefly of two women, Lavoisin and Lavigoreux, who combined with the ostensible occupation of midwife that of fortune-teller, and foretold to wives the decease of their husbands, to needy heirs that of their rich relatives, taking care at the same time to be instrumental in fulfilling their own predictions. Their houses were frequented by numbers of all classes, both from Paris and the provinces, among whom were the celebrated Marshal de Luxembourg (q.v.), the Duchess de Bouillon, and the Countess de Soissons; the two former of these, however, went merely from curiosity. Lavoisin and her confederate were at last discovered, tried, condemned, and burned alive in the Place de Grève 1680, Feb. 22; and 30 to 50 of their accomplices were hanged in various cities of France. So common had this atrocious practice been, that Madame de Sévigné, in one of her letters, expresses a fear lest the term 'Frenchman' and 'poisoner' should become synonymous. For two years after the burning of the two Parisian prisoners, the crime continued to be largely committed, being fostered by the impunity with which offenders of high rank were allowed to escape; and it was not till more than 100 persons had died at the stake or on the gallows, that the government succeeded in suppressing it. The mania for secret poisoning has not since been revived, though isolated instances have occasionally been discovered. See Beckmann's *History of Inventions*, the historians of the period of James I.'s reign, the French *Causes Celebres*, and Mackay's *Popular Delusions*.

POISONS: For convenience of reference in sudden emergencies a table is here given of the principal P., the symptoms they produce, and readily procurable household means of counteracting them. Treatment of the subject follows tables.

POISONS.

POISONS.	SYMPTOMS.	ANTIDOTES AND REMEDIES.
IRRITANTS. *a.* METALLIC. *Antimony.* Tartar emetic, Butter of A., Oxide of A., Sulphide of A.	Great burning in pit of stomach, nausea, vomiting, diarrhœa, fainting, skin cold, pulse rapid and small, clammy perspiration.	In the nausea promote vomiting by tickling the throat internally with a feather and giving draughts of lukewarm water. Administer astringents, as decoction of oakbark or strong green tea.
Arsenic. White A., Fowler's solution, Cheele's green, Paris green, Orpiment, etc.	Usually in 30 min. faintness, nausea, burning in throat and stomach, retching, vomiting of dark greenish or yellow matter with blood streaks; great thirst, cramps in legs; rapid, small pulse.	Administer sweet oil or melted butter, and milk; produce vomiting with an emetic; frequent draughts of magnesia or of powdered chalk, and water; mucilaginous drinks, as slippery elm decoction.
Bismuth. Pearl white, Iodide of B., Nitrate of B.,	Burning in throat, vomiting, diarrhœa, metallic taste, hiccup.	Empty the stomach with emetics or lukewarm water, then great draughts of mucilaginous liquids and milk; purgatives.
Chromium. Potassium bichromate, Chrome yellow.	Vomiting, diarrhœa, paralysis.	Emetics; then magnesia or powdered chalk, in water.
Copper. Verdigris, Blue vitriol, Carbonate of C.	Retching, coppery taste, vomiting of blood-streaked greenish matter; headache, colic, spasms, convulsions.	Promote vomiting with lukewarm water draughts, alternating with mucilaginous liquids, milk, white of egg. Strong coffee serves as an antidote.
Gold. Terchloride.	Nausea, vomiting, burning in stomach, faintness, cramps, excessive thirst.	Emetics; magnesia or powdered chalk, in water; mucilaginous drinks and purgatives.
Iron. Copperas, or green vitriol.	Vomiting, purging, colic, tension in pit of stomach.	Magnesia or carbonate of soda, or powdered chalk, in water.
Lead. Sugar of L., White L., Red L., Litharge.	Burning in throat, great thirst, vomiting, distress in pit of stomach, severe colic pains, tension of abdomen, vertigo, convulsions.	Epsom or Glaubers salts, *not* magnesia nor chalk; purified animal charcoal, albuminous liquids, white of egg, milk.
Mercury. Corrosive sublimate, Vermilion, Mercurial ointment, White precipitate, Red precipitate.	Immediately, constriction and burning in throat, metallic taste, great pain in stomach and abdomen, vomit of mucus and blood, small, rapid pulse, cold skin, labored respiration.	Emetics or lukewarm water; magnesia or chalk, in water with common salt; after evacuation of stomach, mucilaginous drinks.
Tin. Putty powder. Tin-liquor, Muriate of T.	Strong metallic taste, nausea, vomiting, diarrhœa, colic.	Milk in large quantities, then carbonate of soda, or magnesia, or powdered chalk, in water.
b. NON-METALLIC. *Acids.* Sulphuric, Nitric, Hydrochloric (muriatic), Citric, Tartaric, Oxalic, Carbolic, etc.	Almost immediately, burning in throat, extending to stomach; colic, retching, vomiting dark brown mucus mixed with blood; difficult respiration, great thirst, constant ineffectual effort to micturate.	Produce vomiting by tickling throat internally; copious draughts of magnesia (or chalk), in water. Alcohol is an antidote to carbolic acid.

POISONS.

POISONS.	SYMPTOMS.	ANTIDOTES AND REMEDIES.
Alkalies. Lye, Potash, Soda, Ammonia. Their salts: Tartrates, Nitrates, Iodides, Chlorides, etc.	Burning in throat, reaching to stomach; vomiting brown matter, blood-streaked; diarrhœa, colic.	Vegetable acids, as lemon-juice, or cider or wine-vinegar; white of egg, milk, barley-water, olive oil, to aid vomiting and neutralize the poison.
c. METALLOIDS. Iodine, Phosphorus, Bromine, Chlorine.	Nausea, vomiting, burning in stomach, colic, diarrhœa.	Free employment of emetics and purgatives; mucilaginous drinks holding magnesia.
d. VEGETABLE IRRITANTS. Creosote, Oil of tar, Oil of turpentine, Ergot of rye, Aloes, Squirting cucumber. Decaying vegetable matter, etc.	Severe abdominal pain; sometimes excessive purging and convulsions.	Emetics, purgatives, catharctic injections, fomentation of the abdomen.
e. ANIMAL IRRITANTS. Cantharides, Decaying animal matters, as cheese, sausages, shellfish. Ptomaines, Virus of serpents, spiders, etc.	Nausea, vomiting, colic, etc. In the case of bites or stings inflammation at the point of injury.	When the poison enters through the digestive system, administer sweet oil, milk, and mucilaginous liquids copiously. For bites and stings apply a moderately tight ligature above the seat of injury, wash wound with warm water, promote flow of blood. The patient should be put to bed and well covered.
NARCOTICS. Opium (morphine), Chloral, Chloroform, Ether, Prussic acid, Gelsemium, Hyoscyamus, etc.	Headache, vertigo, insensibility, coma.	Prompt evacuation of stomach by emetics or stomach pump; strong tea or coffee; pouring cold water on chest and spine. Incite the patient to muscular action by supporting on both sides and compelling him to walk. In prussic acid poisoning the only recourse is to affusions of cold water on the spine.
NARCOTICO-IRRITANTS. Nux vomica, Certain fungi (toadstools), Ptomaines, Belladonna. White hellebore, Aconite, Digitalis, Tobacco, etc.	Various, but usually there is vomiting, diarrhœa, stupor, paralysis.	Emetics or evacuation by stomach pump. Laxative injections if the intestines seem to be involved.
GASES. Carbonic acid, Coal gas, Natural gas, Sulphuretted hydrogen, etc.	Giddiness, nausea, insensibility, tendency to sleep, great prostration. Respiration first stertorous, then suspended; heart action intermittent.	Promote respiration artificially. If the skin is warm pour cold water on head and spine; if the skin is cold employ a warm bath.

POISONS.

POI'SONS: commonly defined as substances, which, administered in small quantity are capable of acting deleteriously on the body; but this definition is too restricted, for it excludes numerous substances which are poisonous only when administered in large doses: e. g., nitre, and the salts of lead, antimony, etc. A person may be poisoned as effectually by an ounce of nitre as by five grains of arsenic. The suggested definition: 'A poison is a substance which, when taken internally, is capable of destroying life without acting medicinally on the system,' is not perfect, for it does not include poisons that act by absorption when applied to a thin and delicate membrane, e. g., glanders, syphilitic poison, etc., or those which must be introduced directly into the circulation by a puncture or abraded surface, as the venom of insects, scorpions, and serpents, the woorali poison (see CURARE), and that of animals suffering from hydrophobia. Omitting for the present, the cases not included in the above proposed definition, we may consider poison as divisible into three classes according to their mode of action on the system—*Irritants*, *Narcotics*, and *Narcotico-Irritants*.

The *Irritants* in ordinary doses speedily occasion intense vomiting and purging, and severe abdominal pain. They act chiefly on the stomach and intestines, which they irritate, inflame, and frequently corrode, and may thus occasion ulceration, perforation, or gangrene. Among those which possess corrosive properties are the strong mineral acids, caustic alkalies, corrosive sublimate, etc.; while among the pure irritants which exert no destructive chemical action on the tissues with which they come in contact, are arsenic, cantharides, carbonate of lead, etc. The *Narcotics* act specially on the brain and spinal cord. Among their most common symptoms are giddiness, headache, obscurity of sight or double vision, stupor, loss of power of the voluntary muscles, convulsions, and, finally, complete coma. Moreover, many of the narcotic poisons present special symptoms, in some cases strongly resembling special disease. Thus there is almost exact similarity in the symptoms of poisoning by opium and of apoplexy, while prussic acid and some other poisons give rise to symptoms closely resembling those of epilepsy. These poisons have no acrid, burning taste, nor do they usually give rise to vomiting or diarrhea; and, except a slight fulness of the cerebral vessels, they leave no well-marked post-mortem appearance. They are few in number, and none of them belong to the mineral kingdom. The *Narcotico-Irritants* have as their name implies, a mixed action. 'At variable periods, after they have been swallowed, they give rise to vomiting and purging, like irritants, and sooner or later produce stupor, coma, paralysis, and convulsions, owing to their effect on the brain and spinal marrow. They possess the property, like irritants, of irritating and inflaming the alimentary canal. As familiar examples, we may point

to nux vomica, monkshood and poisonous mushrooms. .....The fact of the symptoms occurring after a meal at which some suspicious vegetables may have been eaten, coupled with the nature of the symptoms themselves, will commonly indicate the class to which the poison belongs. Some narcotico-irritants have a hot, acrid taste, such as the aconite or monkshood; others an intensely bitter taste, as nux vomica and its alkaloid strychnia.'

Under *Irritant Poisons* may be included, (1) Mineral Acids, as sulphuric, nitric, and hydrochloric acids; vegetable acids, and other salts, as oxalic acid, binoxalate of potash, and tartaric acid (in doses of half an ounce or more), the alkalies, as pearl-ash (carbonate of potash), soap lees (carbonate of soda), ammonia and its sesquicarbonate; and metallic compounds, as white arsenic (arsenious acid), yellow arsenic (orpiment), corrosive sublimate, bicyanide of mercury, pernitrate and other salts of this metal, acetate of lead (sugar of lead) in doses of an ounce and upward, carbonate of lead (white lead), sulphate of copper (blue vitriol), subacetate of copper (verdigris), arsenite of copper (commonly known as *Scheele's green* or *emerald green*), tartarized antimony, chloride of antimony (butter of antimony), chloride of zinc; nitrate of silver (lunar caustic), sulphate of iron (copperas or green vitriol), and bichromate of potash, (2) Vegetable substances, as colocynth and gamboge in large doses, savin, croton oil, leaves and flowers of the common elder (*Sambucus nigra*), etc. (3) Animal Substances, such as cantharides, to which must be added the occasional cases in which sausages, and certain fish and mollusks, usually quite innocuous, act as irritant poisons (ptomaines).

The *Narcotic Poisons* include opium, hydrocyanic (or prussic) acid, oil of bitter almonds, cyanide of potassium, henbane especially the seeds, alcohol, ether, chloral, and chloroform; while *Narcotico-Irritant Poisons* are nux vomica, meadow saffron (*Colchicum*), white hellebore, foxglove, common hemlock, water hemlock (*Cicuta virosa*), hemlock, water-dropwort (*Œnanthe crocata*), fool's parsley, thorn-apple, monkshood or wolf's bane, deadly nightshade, tobacco, Indian tobacco (*Lobelia inflata*), the bark and seeds of the common laburnum, the berries and leaves of the yew-tree, and certain kinds of fungi.

The cases in which there are antidotes qualified to neutralize chemically the action of the poison are few in number. For the *mineral acids* should be administered chalk of magnesia in water, with the view of neutralizing them, after which milk should be given freely. The *alkalies* and their carbonates must be neutralized by vinegar and water, or lemon-juice mixed with water after which milk should be given. For *oxalic acid* the antidote is chalk or magnesia in water, by which an insoluble oxalate of lime or magnesia is formed. For *arsenic*, the hydrated peroxide of iron has been regarded as an anti-

dote, but its efficacy is doubtful. Vomiting should be excited by administration of a scruple of sulphate of zinc in warm water, and after the stomach has been well cleared out, demulcent fluids, such as flour and water or milk should be given. *Corrosive sublimate* combines with albumen (white of egg), and forms an insoluble inert mass; *nitrate of silver* is neutralized by chloride of sodium (common salt) dissolved in water; *tartarized antimony* is to a great degree rendered inert by a decoction of bark or gall-nuts; and *acetate of lead* is rendered inert by sulphate of magnesia, which converts it into an insoluble sulphate of lead. In all cases of suspected poisoning, in which the nature of the poison is not known, the safest course is at once to produce vomiting by sulphate of zinc, or in its absence by a dessert-spoonful of flour of mustard suspended in tepid water, and to continue the vomiting till all the contents of the stomach are discharged, after which milk should be given freely.

Most of the known gases—except hydrogen, nitrogen, and oxygen—have a poisonous action when inhaled into the lungs; but in these cases death, if it ensues, is popularly said to be due to *suffocation*, though strictly speaking a person who dies from the effect of carbonic acid, or sulphuretted hydrogen, or of any other noxious gas, is in reality just as much poisoned as if he had taken oxalic acid or arsenic. *Carbonic Acid* (q.v.), though seldom employed as an instrument of murder, is often a cause of accidental death, and in France of self-destruction. It is established by numerous experiments that air containing more than *one-tenth* of its volume of carbonic acid, will, if inhaled, destroy life in man and the higher animals. In its pure state it cannot be inhaled, because its contact with the larynx causes spasmodic contraction of the glottis; but when diluted with two or more volumes of air, it can be breathed, and produces symptoms of vertigo and somnolency; and so great a loss of muscular power, that the individual, if in an erect or sitting position, falls as if struck to the ground. The respiration, at first difficult and stertorous, becomes suspended. The action of the heart is at first violent, but soon ceases, sensibility is lost, and the person falls into a comatose or death-like state. Those who have been resuscitated usually feel pain in the head and general soreness of the body for some days, and in a few severe cases paralysis of the muscles of the face has remained. As deaths frequently occur from coal or charcoal being employed as fuel in ill-ventilated rooms (often without any kind of chimney), it is expedient that every one should know what is to be done in such an emergency. The patient must be at once removed from the poisonous atmosphere, after which artificial respiration should be had recourse to. If the skin is warm, cold water may be poured on the head and spine; if the surface be cold, a warm bath should be employed. When respiration is re-established, venesection will often relieve the congestion of the ves-

sels of the brain. Inhalation of oxygen gas is said to been of service in these cases. *Carbonic oxide*, which exists largely in coal gas, is at least as active a poison as carbonic acid, and is doubtless the principal cause of the effects produced by inhalation of diluted gas. Both carbonic acid and carbonic oxide act as powerful narcotic poisons. *Sulphuretted hydrogen*, abundant in foul drains, sewers, cesspools, etc., is a gaseous poison whose effects are often noticed. Nothing certain is known of the smallest proportion of this gas required to destroy human life; but air containing only one-eight-hundredth of its volume of this gas will destroy a dog; and when the gas exists in the proportion of one two-hundred-and-fiftieth, it will kill a horse. A medical authority states that the men engaged in the construction of the Thames Tunnel in London suffered severely from this gas, derived probably from the action of the water on the iron pyrites in the clay, and which issued in sudden bursts from the walls. By respiring this atmosphere, the strongest and most robust men were in a few months reduced to extreme exhaustion, and several died. The first symptoms were giddiness, nausea, and general debility; the men became emaciated, and fell into low fever accompanied by delirium. In this case the dilution was extreme; when the gas is breathed in a more concentrated form the person speedily falls, apparently lifeless. It appears to act as a narcotic poison, when concentrated; but like a narcotic-irritant, when much diluted with air.

The action of the vapor of *hydrosulphate of ammonia*, also commonly present in cesspools, etc., is probably much the same as that of sulphuretted hydrogen.

Many of the gases, found only as products of the laboratory, are in the highest degree poisonous, as arseniuretted hydrogen, cacodyl, etc.; but few persons run the risk of inspiring them.

We turn to consider the poisons not included in the definition which, in lack of a better, we have adopted. The poisons that may affect the body by direct introduction into the circulation, through a puncture or abrasion. may be derived from the mineral, the vegetable or the animal kingdom; but with a few exceptions (e.g., Woorali or Curare [q.v.] poison), the poisons derived from the mineral and vegetable kingdoms would act as efficiently if introduced into the stomach as if injected into the circulating blood, while the animal poisons act only by direct introduction into the blood, and are inert when introduced into the stomach. Poisoned wounds derived from dissection of recently dead bodies, known as *dissecting wounds*, are occasionally attended with most alarming symptoms, and are liable to terminate fatally. For the symptoms produced by bites and stings of insects, arachnidans, and serpents, and for the treatment, see VENOMOUS BITES AND STINGS. For poisoned wounds from diseased animals, see GLANDERS: HYDROPHOBIA.

The sale of poison is regulated by law in most of the states of the Union, the law of New York requiring apothecaries to keep a register of sales of certain poisons; and in the case of other poisonous substances, to attach to each package containing them a label bearing in plain letters the word 'poison.' In Massachusetts the law concerning the sale of poisons covers more than thirty substances: whoever sells any of these without a physician's prescription, must affix to the bottle, box, or wrapper, a label of red paper having in large letters the word 'poison'; also giving the antidote, if there be one.—Many of the states have laws inflicting severe penalties on poisoners. An indictment for murder by poisoning need not specially allege intent to kill. To constitute the crime of poisoning, it is not necessary that there should be a delivery of the poison by hand.

POISON ELDER—POISON IVY—POISON OAKS—POISON SUMACH—POISON VINE. See SUMACH.

POISSON, *pwâ-sōng'*, SIMEON-DENIS: French geometer: 1781, June 21—1840; b. Pithiviers, dept. of Loiret. He studied in the École Polytechnique; and his mathematical talent early attracted the notice of Lagrange and Laplace. In 1802 he became a professor in the Polytechnique; 1808, a member of the Bureau des Longitudes; 1809, professor of mechanics to the Faculty of Sciences; member of the Institute 1812, etc.; and in 1837 he was made a peer of France. He was characterized by simplicity, modesty, and affectionateness. Poisson's whole life was given to scientific research; and among the results are 300 Memoirs, in the publications of the École Polytechnique, of the Acad. of Sciences, and in other scientific journals. A complete summary by Poisson himself is published by Arago (*Notices Biographiques* II.). Of his separate treatises the following are chief: *Traité de Mécanique* (2 vols. 1833): *Nouvelle Théorie de l'Action Capillaire; Théorie Mathématique de la Chaleur* (1835); *Memoirs sur le Mouvement des Projectiles dans l'Air, en eyant égard à la Rotation de la Terre* (1839); and the famous work, *Sur l'Invariabilité des Moyens Mouvements des grands Axes Planétaries.* Poisson is considered one of the chief founders of the science of mathematical physics.

POISSY, *pwâ-sē*, France, a town in the department of Seine-et-Oise, on the left bank of the Seine, 11 miles southwest of Versailles. The weekly cattle market, chiefly for the supply of the capital, is said to be the largest in France. The town possesses considerable historical interest from the famous conference of Poissy in 1561, in which the differences between Roman Catholicism and Protestantism were discussed at great length but with no decisive result. Among the attendants were Charles X. and Catherine de' Medici; the principal debaters were Theodore Beza and the papal legate Ippolito d'Este. Pop. (1901) 7,506.

POITIERS, *poy-tērz′*, F. *pwâ-te-ā′*, earlier *Poictiers* (corruption of the Latin *Pictavium*, so called by the Gallic tribe *Pictavi*, who inhabited the district in Cæsar's time); one of the oldest towns in France; capital of the dept. of Vienne, and formerly of the province of Poitou. Pop. (1901) 39,386. It occupies the summit and slopes of a little eminence, round the base of which flow the Clain and the Boivre, is encircled by walls and towers, and has a very full appearance. It is connected by railway with Tours, 63 m., and with Bordeaux. Before the Revolution P. had an immense number of churches, chapels, monasteries and nunneries; even yet these are numerous. The principal are the church of St. Jean (now a *Musée*), one of the oldest Christian monuments in France; and the cathedral of St. Pierre, one of the finest in France, belonging (in part) to the 12th c., and in which, or in the older edifice that occupied its site, 23 councils were held—the first in the 4th, the last in the 15th c. It contains the ashes of Richard Cœur-de-Lion. Its university, founded by Charles VII., 1431, was abolished after 1789, but its place has been supplied by a university-academy with two faculties. P. possesses a public library of 25,000 vols. and MSS.; a museum; and several learned societies, including one for studying the antiquities of w. France. In and around P. are numerous Celtic and Roman remains. In 1882 the remains of a Gallo-Roman town were discovered here, with temple, baths, and streets, spread over about 14 acres. In the vicinity, Alaric II., the Visigoth, was defeated and slain by Clovis 507. Somewhere between P. and Tours a great battle took place 732 between Franks under Charles Martel (q.v.) and the Moors under Abd-ur-Rahmân. The Moors were routed with enormous slaughter—375,000 of them (according to one old exaggerating chronicler) being left dead on the field; later still (1356) at Maupertuis-le-Beauvois, about 5 m. n. of P., Edward the Black Prince, with 12,000 or 14,000 Englishmen and Gascons, defeated 60,000 of the troops of King Jean of France and took the king and one of his sons prisoners.

POITOU, *pwâ-tō′*: former province of w. France, now mainly comprised in the depts. Deux Sèvres, Vendée, and Vienne. It was divided into Upper and Lower P., and had for its cap. Poitiers (q.v.). P. became a possession of the English crown when Eleanor, Countess of P. and Duchess of Aquitaine, after her divorce from Louis VII. of France 1151, Sep., married, on Whitsunday following, Henry of Anjou, afterward Henry I. of England. Philippe-Auguste reconquered the province 1204, and 1295 it was formally ceded to France. By the peace of Bretigny 1360 it again reverted to England, but was soon retaken by Charles V., who gave it to his brother, the Duke of Berri. It was later incorporated with the French crown.

POITRINAL, *poy′trĭn-al*, or PECTORAL, *pĕk′tō-ral*, in Ancient Armor: the horse's breastplate, of metal plates riveted together, covering the breast and shoulders.

POKANO'KETS: family of N. American Indians, known also as Wampanoags; one of the five families of the Algonkin tribe that occupied Mass. at the time of the English settlement. Their chief, Massasoit (q.v.), signed a treaty with the settlers; and under his son, Metacomet, the P. led the uprising that began King Philip's Indian war. Nearly all the survivors of that war were sold as slaves in the W. Indies or otherwise scattered.

POKE, v. *pōk* [Gael. *puc*, to push: Dut. *poken*, to poke; *poke*, a dagger: Icel. *piaka*, to thrust, to pick: Norw. *paak;* Sw. *pak*, a stick: prov. F. *poque*, a blow with a ball: Ger. *pochen*, to knock]: to thrust or push against with anything pointed, as with a stick, or as a bull with its horns; to search or feel for, as in the dark; to grope; to search; to feel. POK'ING, imp. busying one's self without a definite object, followed by *about*. POKED, pp. *pōkt*. POKER, n. *pōk'er*, one who pokes; an iron bar used to stir fires; a bar of iron for driving hoops on masts. POKER-PICTURES, imitations of pictures executed by singeing the surface of white wood with a heated poker, such as that used in Italian irons. POKING-STICK, a laundress's wooden stirrer. TO POKE FUN, to make fun. TO POKE AT, to thrust the horns at. POKE-WEED, N. Amer. herbaceous plant, producing numerous bunches of black juicy berries; the *Phytolac'ca decan'dra* (see PHYTOLACCA).

POKE, n. *pōk* [Ir. *poc;* Gael. *poca*, a bag: Dut. *poke:* Icel. *poki*]: a sack; a bag; a pouch. TO BUY A PIG IN A POKE—that is, a *pocket* or *bag*—to buy a thing without seeing it, or without knowing its qualities and real value. POKY, or POKEY, a. *pōk'i*, narrow; close; confined.

POKER: game of cards. It is played with a full pack of 52 cards. *Straight Poker* (the original game) is almost pure 'bluff'; so the player has nothing to guide him in judging what the other players hold. Each player puts up a certain amount before the deal. There is no betting. In *Draw Poker* a card is dealt to each player, face up, and the one receiving the lowest card deals. The number of players can be from two to seven, but five is the best number. The terms used are the following: *Age*, or *Blind*, or *Eldest hand*, is the player at the left of the dealer. *Bluff* is betting high on a weak hand, endeavoring to frighten others out of the game. *Call* is when the person whose turn it is to bet last deposits the full amount already bet by the others, and says 'I call,' when all hands must be shown, and the highest wins. *Draw* is to take one or more new cards in place of those discarded, but the privilege is but for once, when the players first look at their hands, and it begins with the *Age*. *To see* is to equal a bet. *Going better* is when one player bets higher than another. *Coming in*, any one entering the game by putting up double the amount of the *Ante* or the *Straddle*. *Going out*, one who gives up his hand and his interest in the amount bet. *Straddle*, double the amount of the ante.

The value of the cards is the same as in whist, that is, ace, king, queen, jack, ten, etc. The value of the hand

ranks as follows, beginning at the lowest. *One pair*, a hand that holds a pair, e.g., of queens or fours, etc. *Two pair hand*, a hand with two pairs. If two players hold the same pairs, the one with the highest odd card wins. *Threes*, when a person holds three of the same value. The highest *Three* wins. *Straight*, when the five cards rank in regular order, without regard to suit, e.g., eight, nine, ten, jack, queen. The ace in this hand can count as one. *Flush*, five cards of the same suit, as five diamonds, or five spades, without regard to the value of the cards. The flush containing the highest card wins. *Full hand*, one containing three of a kind and a pair. The hand holding the highest three of a kind wins. *Fours*, a hand which holds four of the same denomination, e.g., four kings, or four twos. *Straight flush* (the highest) is a hand where all the cards are of the same suit and in any regular order, e.g., king, queen, jack, ten, nine. It is better to have a limit decided upon, although it is not obligatory. The game is unfortunate in its association with gambling. There are other vareties of P. Draw P. is regarded by many as especially objectionable because betting is an essential feature, even though no money be at stake, i.e., as played only for the pleasure of winning so many 'chips,' which are disks that represent money in real betting. The same may be said substantially of the 'jack-pot' games of P., in which the stake is made before playing.

POKHURN, *pŏk-hėrn':* town of India, in the Rajpoot state of Jodhpoor, 340 m. s.w. of Delhi; close to a deserted town of the same name, whose site is marked by a very conspicuous temple on a height. P. has considerable trade. Pop. about 15,000.

POLA, *pō'lâ:* most important naval station of Austria, and one of the most beautiful havens in Europe. The town belongs to the Markgrafate of Istria, and occupies an eminence overlooking the Adriatic Sea, 55 m. s. of Trieste. The bay is thoroughly sheltered, and spacious enough to accommodate the largest fleet. The town is surrounded by bastioned walls, is protected by numerous batteries, and is overlooked by the citadel by which it and the bay are commanded. Pop. (1880) 25,173; (1890) 39,273; (1900) 45,205.

P., a very ancient town, is said in legend to have been founded by the Colchians sent in pursuit of Jason. It was destroyed by Julius Cæsar, but rebuilt by Augustus at the request of his daughter Julia, on which account it was named *Pietas Julia*. In ancient times it had 30,000 inhabitants, and was a station of the Roman fleet. It contains numerous and interesting Roman remains, among which are a beautiful and well-preserved amphitheatre, 436 ft. long and 346 broad. A temple and several ancient gates also remain. See Allason's *Antiquities of Pola* (Lond. 1819).

POLACCA, n. *pō-lăk'kă* [Port. *polaca;* It. *polacra*], or POLACRE, n. *pō-lā'kĕr* [Sp. and F.], or, POLAQUE, n. *pō'lăk* [F.]: vessels common in the Mediterranean, with three masts and a jib-boom; the fore and main-masts each of one piece ('pole-masts'), and the mizzen-mast with a top and top-mast. They usually carry square sails, though a few are rigged with a peculiar form of sail to which also the term *polacre* is applied. The fore and main-masts have, of course, neither tops, caps, nor cross-trees.

POLACCA, n. *pō-lăk'kă* [F. *polaque*], or POLONAISE (q.v.): a Polish national dance of slow movement in ¾ time. It always begins and terminates with a full bar, and a peculiar effect is produced by the position of its cadence, the dominant seventh in the second crotchet of the bar preceding the triad on the third crotchet. The characteristic features of the P. are sometimes adopted in a Rondo, or other lively and brilliant composition, which is then said to be written *Alla Polacca* [It., in the style of the Polacca].

POLACK, n. *pō'lăk* [F. *Polaque*]: in *OE.*, an inhabitant of Poland, a person from Poland.

POLAND, JOHN SCROGGS, American soldier: b. Princeton, Ind., 1836, Oct. 14; d. Asheville, N. C., 1898, Aug. 8. He graduated at West Point in 1861, and entered the army immediately. He took part in the battles of Antietam, Fredericksburg, and Chancellorsville, and in 1863–65 he was commissary of musters for Washington. From 1865 to 1869 he was professor at West Point, and then was sent to the West on frontier duty. In 1881–86 he was at the head of the Department of Law of the United States Infantry and Cavalry School at Fort Leavenworth. At the outbreak of the Spanish war, he was commissioned brigadier-general of volunteers; but died before the close of the war, while with his command, at Chickamauga. He wrote *Digest of the Military Laws of the United States from* 1861–1868 (1868); and *Saint Petersburg International Commission* (1886).

POLAND, *pō'land;* called by the natives *Polska* (a plain): former kingdom in Europe—renowned in mediæval history as the sole champion of Christendom against the Turks; and through the earlier part of the 19th c. an object of general and profound sympathy throughout w. Europe, from its unprecedented misfortunes. Immediately previous to its dismemberment, P. was bounded n. by the Baltic Sea from Danzig to Riga, and by the Russian provinces of Riga and Pskov; e. by the Russian provinces of Smolensk, Tchernigov, Poltava, and Kherson; s. by Bessarabia, Moldavia, and the Carpathian Mountains; w. by the Prussian provinces of Silesia, Brandenburg, and Pomerania. Its greatest length n. to s. was 713 English m.; e. to w. 693 m.; about 282,000 sq. m. This area had pop. (1880) 24,000,000. The present pop. of the provinces included in the P. of former days consists of Poles, Lithuanians, Germans, Jews, Russians, Roumanians, gypsies, etc. The Poles, 15,600,000, form the bulk of the population; the Lithuanians, 2,100,000, inhabit the n.e. of the country; the Germans, 2,000,000, live mostly in towns and in villages by themselves, and bear the usual character for economy, industry, and that excessive love and admiration for the 'Fatherland' which guided their politics during the last days of Polish independence; the Jews are numerous, reckoned at 2,200,000, but here they are poorer and less enterprising than in other countries; the remainder is composed of Russians (few, excepting in some e. districts), Russian soldiery, Roumans, gypsies, Magyars, etc. As to religion: of Rom. Catholics there are about 9,400,000; Greeks, United and Non-United, 7,900,000; Protestants (mostly Lutherans and German) 2,360,000; the rest are Jews, Armenians, Moslems, etc. This extensive tract forms part of the great central European plain, and is crossed by only one range of hills, which springs from the n. side of the Carpathians, and extends n.e. through the country, forming the watershed between the Baltic and Black Sea rivers. The soil is mostly a light fertile loam, well adapted for cereal crops, though here and there are extensive barren tracts of sand, heath, and swamp, especially in the e. districts. Much of the fertile land is permanent pasture of richest quality; much is occupied with extensive forests of pine, birch, oak, etc. Rye, wheat, barley, and other cereals, hemp, wood and its products, honey and wax, cattle, sheep, and horses, inexhaustible mines of salt, and a little silver, iron, copper, and lead, constitute the chief natural riches; and for export of the surplusage of these products, the Vistula, Dnieper, Duna, and their tributaries afford extraordinary facilities.

The kingdom of P., during the period of its greatest extent, after the accession of the grand duchy of Lithuania in the beginning of the 15th c., was sub-divided for purposes of government into about 40 palatinates or voivodies, governed mostly by hereditary chiefs. The people were divided into two great classes—nobles and

serfs. The governing and privileged class included the higher nobles, the inferior nobles (a numerous class, corresponding to the knights, gentry, etc., of other countries), and the clergy; and numbered in all more than 200,000: the serfs were the merchants, tradesmen, and agriculturists, and were attached, not, as in other countries, to masters, but to the soil, being thus much less liable to ill-usage, and retaining more human energy and dignity. The nobles were proprietors of the soil, and appropriated the larger portion of its products, the serfs in many cases receiving only as much as was necessary for the support of themselves and their families. The nobles were chivalrous, high-spirited, hospitable, and patriotic; the serfs, who had also a stake, though a small one, in the independence of the country, were patriotic and good-natured, but sluggish.

History.—The Poles are ethnologically a branch of the Slaves (q.v.). The name appears in history first as the designation of a tribe, the Polani, who dwelt between the Oder and Vistula, surrounded by the kindred tribes of the Masovii, Kujavii, Chrobates, Silesians, Obotrites, and others. The Polani acquired an ascendency over the other tribes, most of whom became amalgamated with the ruling race, whose name thus became the general designation. Polish historians profess to go as far back as the 4th c.; but the lists of rulers which they give are probably those of separate tribes, and not of the combined race now known as Poles. At any rate, the history of P., previous to the middle of the 9th c., is so largely adulterated with fables as to be little trustworthy.—Ziemovicz, said to be the second monarch of the Piast dynasty, is considered the first ruler whose history is to any extent to be relied on; and it was not till a century later, when his descendant, Micislas I. (962–992), occupied the throne, and became a convert to Christianity, that P. took rank as one of the political powers of Europe. Micislas (as was the general custom among the Polish rulers) divided his dominions among his sons; but one of them, Boleslas I. (992–1025), surnamed 'the Great,' soon reunited the separate portions, and extended his kingdom beyond the Oder, the Carpathians, and the Dniester, and sustained successful war with Emperor Henry II. of Germany, conquering Cracovia, Moravia, Lusatia, and Misnia. He took part also in the dissensions of the petty Russian princes. Under him, P. began to assume unity and consistency; commerce, impartial administration of justice, and Christianity were encouraged; and about the same time, the distinction between the nobles or warrior class (those who were able to equip a horse) and the agriculturists was distinctly drawn. Boleslas was recognized as 'king' by the German emperors.—After a period of anarchy, he was succeeded by his son, Casimir (1040–58), whose reign, and that of his warlike son, Boleslas II. (1058–81), though brilliant, were of little profit to the country. The latter monarch having with his own hands murdered

the bp. of Cracow (1079), P. was laid under the papal interdict, and the people absolved from their allegiance; Boleslas accordingly fled to Hungary, but being, by order of the pope, refused shelter, he is said to have committed suicide (1081).—BOLESLAS III. (1102–39), an energetic monarch, annexed Pomerania, defeated the pagan Prussians, and defended Silesia against the German emperors. A division of the kingdom among his sons was productive of much internal dissension, under cover of which Silesia was severed from P., though still nominally subject to it.—Ultimately, CASIMIR II. (1177–94) reunited the severed portions, except Silesia, and established on a firm footing the constitution of the country. A senate was formed from the bishops, palatines, and castellans, and the rights of the clergy and of the peasantry were accurately defined. His death was the signal for a contest among the various claimants for the throne, speedily followed, as usual, by a division of the country; and during this disturbance Pomerania freed itself from Polish rule. About the same time, the Teutonic Knights were summoned by the Duke of Masovia to aid him against the pagan Prussians; but they soon became as formidable enemies to P. as the Prussians, and conquered great part of Podlachia and Lithuania. The Mongols swept over the country 1241, reducing it to the verge of ruin, and defeating the Poles in a great battle near Wahlstatt. From this time, P. began to decline; various districts were ceded to the markgrafs of Brandenburg, while many districts began to be colonized by Germans. Numbers of Jews, persecuted in w. Europe about this time took refuge in Poland.—LADISLAS (1305–33), surnamed *Lokietek* (the Short), restored unity to the country; judicial abuses and all illegally acquired privileges were abolished, and the first diet (1331) assembled for legislative purposes. In conjunction with Gedymin, Grand Duke of Lithuania, a vigorous war was carried on against the Teutonic Knights, on returning from which the monarch (70 years old) had a triumphant reception from his subjects, who hailed him as the 'father of his country.'—His son, CASIMIR III. the Great (1333–70), greatly increased the power and prosperity of P. by cultivating with zeal the arts of peace, amending the laws, and consolidating his territories by profitable exchanges with the neighboring powers. In the latter part of his reign, he successfully defended sundry new acquisitions against the Tartars, Lithuanians, and Walachians. With Casimir, the Piast dynasty became extinct, after a sway of 510 years, according to the old Polish chroniclers.—His nephew, LEWIS the Great, King of Hungary, succeeded him, by the will of the deceased monarch and the election of the diet; but during his reign, P. was treated merely as an appanage of Hungary. On his death without male heirs, the crown fell to JA-

Lithuania and P., thus doubling the extent, though not the population, of the kingdom. However, his successor, LADISLAS III., was acknowledged only in P. proper, the Lithuanians preferring the rule of the younger son, Casimir. Ladislas was chosen king of Hungary also, and fell at the battle of Varna; being succeeded in P. by CASIMIR IV. (1444–92), who again united it to Lithuania. Casimir recovered W. Prussia from the Teutonic Knights, and compelled them to do homage for E. Prussia, rewarding the inferior nobles, or warrior class, with more extensive privileges, putting them on equality of rank with the great chiefs of the realm, and at the same time necessarily oppressing the peasantry. Manufactures and commerce revived to a wonderful extent during his reign in the w. provinces.—The brief reigns of his three sons were marked only by the increased power of the two houses of the diet, which had by this time absorbed all but the symbols of supreme authority, and had converted P. from a monarchy to an oligarchy—the king possessing little power beyond what his personal influence gave him.—SIGISMUND I. (1506–48), surnamed the Great, fourth son of Casimir, raised the country to the height of prosperity. Generous and enlightened, he was beloved by the masses, whom he endeavored to benefit physically and mentally, while his firmness and justice commanded the respect of the turbulent nobles. He wisely kept aloof from the religious quarrels which distracted w. Europe, by allowing his subjects perfect freedom of choice in religion; he was, however, forced into a war with Russia, in which he lost Smolensk; but was partly compensated by obtaining lordship over Moldavia.—His son, SIGISMUND II., Augustus, was a worthy successor. During his reign many abuses were rectified, and the extraordinary privileges of the higher nobles were curtailed or abolished; Lithuania was finally joined indissolubly to P., and from this time there was to be but one diet for the united realm; each retained, however, its own army, titles, treasury, and laws. Lithuania was at the same time reduced by the annexation of Podlachia, Volhynia, and the Ukraine, to Poland. Livonia was conquered from the Knights Sword-bearers (a community similar to, though much less distinguished, than the Teutonic Knights); and the power, prosperity, and opulence of the state seemed to guarantee its position as the most powerful state in e. Europe for a long time to come. The population almost doubled itself under the two Sigismunds; but this dynasty, whose sway was so happy for P., ceased with them; and the warrior class, having tasted the sweets of freedom, determined to preserve it by rendering the monarchy elective. The election was made by the two chambers of the diet—viz., the senate, or chamber of the chief nobles, and the chamber of nuncios, or representatives of the inferior nobles. He who was chosen king possessed the right of assembling the diet, but had to give a list of the subjects to be

discussed; and the representatives, before setting out, were instructed as to the side they were to support. The diet lasted only six weeks, and its decisions were required to be unanimous; so that if the *liberum veto* (the right of forbidding the passing of any measure) were freely exercised even by a single member, all legislation was at a stand-still. The evil effects of these regulations were not so much felt at first, as the members were characterized by honesty and zeal for the general good; but latterly, when venality and subservience to the neighboring powers began to show themselves, all the measures necessary for protecting P. from dependence on her neighbors were, by a few corrupt and treacherous representatives, rendered of no avail.—The first elective monarch was HENRY of Valois (III. of France, q.v.), who, however, soon abandoned the throne for that of France, and was succeeded by STEPHEN BATHORY (1575–86), voivode of Transylvania, a man of energy and talent, who carried on war successfully against the Russians, who had attempted to seize Livonia, pursued them into the very heart of their country, and compelled the czar to sue for peace; he also subdued the semi-independent Cossacks of the Ukraine, and to some degree introduced civilization among them.—His successor, SIGISMUND III. (1586–1632), who was succeeded by his sons, LADISLAS IV. (1632–48) and JOHN CASIMIR (1648–72), was of the Vasa family, and was the crown-prince of Sweden; but his election, far from cementing union between the two countries, only embittered former dissensions. These three Swedish monarchs were most unworthy successors to P.'s ablest king, as they had neither talents for governing, nor characters and sentiments congenial to a warlike nation; on the contrary, their policy was weak, tortuous, and vacillating. Yet they were always quarrelling with their neighbors, declaring war with Russia, Sweden, or Turkey, in the most imprudent and reckless manner, and often without valid pretext. But the Polish armies, though as little fostered and cared for as the other portions of the nation, were everywhere victorious; the Swedish and Muscovite armies were successively annihilated; Moscow was taken, and the Russians reduced to such an abject condition, that they offered to make Sigismund's son, Ladislas, their czar. Sweden made a similar offer to another son of the Polish monarch; but the latter's absurd behavior lost for P. this rich result of her great victories; and the foolish policy of the whole three not only rendered fruitless all the lavish expenditure of Polish blood and treasure, but lost to the country many of her richest provinces, and left her without a single ally; while their religious bigotry commenced that reign of intolerance and mutual persecution between the various sects which was the immediate cause of P.'s downfall. To show the power of the Poles at this period, it will be sufficient to notice that Great P., Little P. (Galicia, Podolia, Ukraine, etc.),

Livonia, Lithuania (including Samogitia and Black and White Russia, Polesia, and Tchernigov), Pomerelia and Ermeland, Courland, Moldavia, Bukovina, Walachia, Bessarabia, and Prussia, were either integral parts of the Polish monarchy, or subject to it. The imprudent attempts of the Swedish sovereigns to amend the constitution only excited the suspicion of the nobles, and led to further curtailment of royal authority. During the reign of this dynasty, Walachia and Moldavia were snatched by the Turks from under the Polish protectorate; Livonia with Riga was conquered (1605–21), with part of Prussia (1629), by Sweden; and Brandenburg established itself in complete independence. The Cossacks, who had been goaded almost to madness by atrocious oppression and religious persecution, rose in rebellion, put themselves under the protection of Russia, and ever afterward proved themselves the most inveterate enemies of the Poles. In the reign of John Casimir (1648–72), P. was attacked simultaneously by Russia, Sweden, Brandenburg (the germ of the present kingdom of Prussia), the Transylvanians, and the Cossacks; the country was entirely overrun; Warsaw, Vilna, and Lemberg taken; and the king compelled to flee to Silesia. But the renowned staff of Polish generals was not yet extinct: Czarniecki's sword was as the breath of the destroying angel to P.'s enemies, which, after being defeated in detail, were ignominiously expelled from the country. But in the subsequent treaties, Ducal or E. Prussia was wholly given up to Brandenburg; almost all Livonia to Sweden; and Smolensk, Severia or Tchernigov, and the Ukraine beyond the Dnieper, were given to Russia.—Michael Wisniowiecki (1668–74), son of one of the group of famous generals above alluded to, but himself an imbecile, was (contrary to his own wish—for he was aware of his own deficiencies) elected as their next monarch; a war with Turkey, concluded by an ignominious peace, was the chief event of his reign. But the senate rejected the shameful treaty, the Polish army was re-enforced, the Polish monarch resigned the command to John Sobieski the Hetman (q.v.), and the Turks were routed with great slaughter at Chotyn (1673).—After some dissensions concerning the election of a successor, John (III., q.v.) Sobieski (1674–96) was chosen; but his reign, though it crowned the Poles with abundance of the laurel wreaths of victory, was productive of no good to the internal administration.—As Sobieski's successor, the Prince of Conti was legally elected, and proclaimed king; but the cabinet of Versailles allowed this splendid opportunity of becoming supreme in Europe to escape; and Augustus II. of Saxony, protégé of the House of Austria, entered P. at the head of a Saxon army, and succeeded in obtaining the throne. Augustus, unlike all his predecessors, never seemed to identify his interests with those of his Polish subjects; and though he gained their hearts by promising to reconquer for P. her lost provinces, yet this promise

was chiefly an excuse for keeping his Saxon army in the country, in violation of the *pacta conventa* (the 'Magna Charta' of Poland). His war with the Turks restored to P. part of the Ukraine and the fortress of Kaminetz; but his war with Charles XII. brought nothing but misfortune. The war with Sweden was unpopular in P.; in fact, the Poles of the e. provinces received Charles with open arms; but his attempt to force on them Stanislas Lesczynski as their king severely wounded their national pride. Augustus returned after the battle of Poltava (q.v.); his rival retired without a contest; a close alliance was formed with Russia, and the Russian troops which had campaigned in P. against the Swedes were, with his Saxon army, retained. The Poles demanded their extradition, but in vain; and the Russian cabinet interfered (1717) between the king and his subjects, compelling both parties to sign a treaty of peace. This was the commencement of P.'s dependence on Russia, and of her consequent decline. By instigation of Peter the Great, the Polish army was reduced from 80,000 to 18,000; and the country was further weakened by diffusion of effeminacy, immorality, and prodigality, through the evil example and influence of the court. Religious fanaticism also developed its most odious features during his reign, and the massacre of the Protestants at Thorn (1724), and the legalized exclusion of them from all public offices, was the result.—The succeeding reign of AUGUSTUS III. (1733–63) was of the same character; the government fell more and more under Russian influence, and its political relations with other countries gradually ceased. Toward the end of his reign, the more enlightened of the Poles, seeing the radical defects of the constitution, the want of a strong central government, and the dangers of the *liberum veto*, entered into a league to promote the establishment of a well-organized hereditary monarchy. But the conservative or republican party was equally strong, and relied on Russian influence; and the conflict between these parties became embittered from the fact that the monarchists supported the Jesuits in disqualifying all dissenters from holding public offices, while the republican party supported the dissidents. The dissidents dated their grievances from 1717, but the great conflict between them and their opponents did not break out till 1763.—The cabinets of St. Petersburg and Berlin now (1764) presented to the Poles STANISLAS PONIATOWSKI as their king. This gross insult, intensified by the incapacity of Stanislas for such an office, could not be borne in quiet; the king and the Russian ambassador were compelled in the diet to listen to the most spirited protests against Russian interference; but the intense national spirit of the Poles only recoiled upon themselves, for the Russian ambassador craftily incited them to insurrection, and kept alive their mutual dissensions. The monarchic or Czartoryski party (so called because it was headed by a Lithuanian prince of this name) had

succeeded in abolishing the *liberum veto*, and effecting many other improvements; but they at the same time more severely oppressed the dissidents; and Russia, finding that the political policy of this party was speedily releasing P. from her grasp, joined the party of the dissidents as the champion of religious toleration. Her ambassador caused the chief leaders of the Rom. Cath. party to be secretly kidnapped, and sent to Siberia, and compelled the republicans to accept the protectorate of Russia. The 'Confederation of Bar' (so called from Bar in Podolia) was then formed by a few zealous patriots, an army was assembled, and war declared against Russia. The confederates were supported by Turkey, which also declared war against the czarina; and Russia in alarm proposed to the king and diet an alliance, which both firmly refused.—Frederick the Great of Prussia, who had formerly gained the consent of Austria to a partition of P., now (1770) made the same proposal to Russia, and in 1772 the *first partition* was effected; Stanislas and his diet claiming the mediation and assistance of the other powers of Europe without effect. He was forced in the following year to convoke a diet for the purpose of recognizing the claims of the three partitioning powers to the territories that they had seized; but few members appeared, and these preserved perfect silence. The territories seized by the three powers were as follows:

	Sq. m.	Pop.
Russia	42,000	1,800,000
Prussia	13,000	416,000
Austria	27,000	2,700,000

The whole country was now aroused to its danger; and the diet of the diminished kingdom labored to amend the constitution and strengthen the administration by a liberal code of laws and regulations, which gave political rights to the cities, civil rights to the peasantry, and rendered the kingly authority hereditary. In this they were encouraged by Prussia, whose king, Frederick William, swore to defend them against Russia; but 1791, Catharine II., after great labor, obtained, by intrigues and bribery, the services of *five* (out of 200,000) of the Polish nobility, who protested against the new constitution which had just then (1791, May 3) been established, and drew up a document at Targowitz (q.v.), which they forwarded to the Russian court.—Catharine, thus armed with a pretext for interference, advanced her army; and Prussia proving traitorous, a second fruitless resistance to the united Prussians and Russians, headed by Joseph Poniatowski (q.v.) and Kosciusko (q.v.), was followed by a *second partition* (1793) between Russia and Prussia, as follows:

	Sq. m.	Pop.
Russia	96,000	3,000,000
Prussia	22,000	1,100,000

—which the diet was forced at the point of the bayonet to sanction. The Poles now became desperate; a gen-

eral rising took place (1794); the Prussians were compelled to retreat to their own country, and the Russians were several times routed; but a new enemy then appeared on the scene. Austria was chagrined at having had no part in the second partition, and was determined not to be behindhand on this occasion; her army accordingly advanced, compelling the Poles to retreat; and fresh hordes of Russians arriving, Kosciusko, at the head of the last patriot army, was defeated; and the sack of Praga, followed by the capture of Warsaw, finally annihilated the Polish monarchy.—The *third and last partition* (1795) distributed the remainder of the country as follows:

	Sq. m.	Pop.
Russia	43,000	1,200,000
Prussia	21,000	1.000,000
Austria	18,000	1,000,000

King Stanislas resigned his crown, and died broken-hearted at St. Petersburg 1798.—The subsequent success of the French against the Russians, and the tempting promises of Emperor Napoleon to reconstitute P., rallied round him a faithful army of patriots, who distinguished themselves in the campaigns of the French against Russia and Austria; but all that Napoleon accomplished in fulfilment of his promise was the establishment by the treaty of Tilsit (1807) of the *duchy of Warsaw*, chiefly out of the Prussian share of P., with a liberal constitution, and the Elector of Saxony as its head. The duchy was an energetic little state, and, under the guidance of Prince Joseph Poniatowski, wrenched western Galicia from Austria (1809), at the same time furnishing a numerous and much-valued contingent to the French armies; but the advance of the grand allied army 1813 put an end to its existence. After the cessions by Austria 1809, the duchy contained 58,290 sq. m., with pop. about 4,000,000.—Danzig was also declared a republic, but returned to Prussia 1814, Feb. 3.—The division of P. was rearranged by the Congress of Vienna 1815, the original shares of Prussia and Austria were diminished, and that part of the duchy of Warsaw which was not restored to Prussia and Austria was united as the *kingdom of P.* (see that article) to the Russian empire, but merely by the bond of a personal union (the same monarch being the sovereign of each), the two states being wholly independent of and unconnected with each other; and the other parts of P. were completely incorporated with the kingdoms which had seized them. The partition of P., as thus finally arranged, was as follows:

	Sq. m.	Pop.(1859.)	Present Political Divisions.
Russia,	220,500	16,000,000	Provinces of Courland, Witebsk, Kovno, Vilna, Grodno, Minsk, Mohilev, Volhynia, Kiev, Podolia; and the *kingdom of Poland* (q.v.).
Prussia,	26,000	3,000,000	Posen, most of W. Prussia, and several districts in E. Prussia.
Austria,	35,500	5.000,000	Galicia, Bukovina, Zips, etc.

Meanwhile, as in mockery of its spirit of independence,

the town of Cracow, with a small surrounding territory, was declared free and independent, under guardianship of Austria.—The czar at first gave a liberal constitution, including biennial diets, a responsible ministry, an independent judiciary, a separate standing army, and liberty of the press; and he seemed to take pride in his title of king of P.; but his brother Constantine, having been appointed military gov., speedily put an end to the harmony between the czar and the Poles, and drove the latter into insurrection. Their discontent at first found vent in secret societies; but 1830, Nov. 30, Constantine and his Russians were driven out of Warsaw, and a general insurrection of the people, headed by the aristocracy, took place. Prince Czartoryski was appointed pres. of the provisional govt., and military leaders, as Radzivil, Dembinski, Bem, etc., were soon found; but a general lack of energy in the administration, dilatoriness of the military leaders, and the checking of the spread of the insurrection for fruitless negotiations with Nicholas, were errors fatal to the success of the Poles. 1831, Jan.—Sep. 8, a series of bloody conflicts was fought, in which the Prussians and Austrians, with pitiable subservience, aided the czar. At first, the Poles were successful; but the taking of the capital by Paskevitch (q.v.) soon ended the war, which was followed of course by imprisonment, banishment, confiscation, and enforced service in the Russian army. From this time, the independence of P. was suppressed, and 1832 P. was declared an integral part of the Russian empire, with a separate administration headed by a viceroy of the czar's choosing; the constitution and laws were abrogated; strict censorship of the press and the Russian spy police-system in all its vigor were established; the country was robbed of its rich literary collections and works of art, and the most severe and arbitrary measures taken to Russianize the people. The outbreaks of 1833 and 46 were punished by the gallows. Simultaneous disturbances (1846) in the Prussian and Austrian portions of P. were summarily suppressed; their leaders in Prussia were imprisoned, and saved from death by only the revolution (1848, Mar.) at Berlin; and those in Austria were butchered by the peasantry, who preferred the Austrian to a national govt. 1846, Nov. 6, the republic of Cracow was incorporated with Austria. After the accession of Czar Alexander II. 1855, the condition of the Poles was ameliorated; an act of amnesty brought back many of the expatriated Poles, and various other reforms were hoped for, when, 1861, another insurrection broke out. Its origin is remarkable, and gives insight into the relations between the Poles and their Russian rulers. A large multitude (30,000) had assembled in the neighborhood of the battle-field of Grochow (where two battles had been fought in the spring of 1831), to pray for the souls of those who had fallen; they were engaged in prayer and in religious chants, when they were charged by the Russian cavalry and gens d'armes,

several of them killed, and numerous arrests made. This event excited intense national feeling throughout the country; and other national demonstrations, attended with similar massacres on the part of the Russians, produced such intense dislike to the latter, that most of the Poles in the Russian service either resigned or deserted. The Russians immediately had recourse to most severely repressive measures, forbidding all assemblages, even in the churches, punishing those who appeared to mourn the death of relatives killed in the previous massacres, or who wore garments of certain shapes or colors. The application of the Polish nation to the czar (Feb. 28) for the re-establishment of the Polish nationality was rejected, but certain necessary reforms were promised. These reforms were on the whole very liberal; but new disturbances broke out in Oct. of the same year. P. was then declared in a state of siege, and General Luders appointed military commandant under Grand Duke Constantine, nephew of the Grand Duke Constantine above mentioned. The country continued in commotion without any very decided outbreak; attempts were made to assassinate the grand duke and the other Russian officials; and 1863, Jan. 13, Lithuania and Volhynia also were put in a state of siege. The Committee of the National Insurrection issued its first proclamation 1863, Feb.; and a week afterward, Mieroslavski raised the standard of insurrection in the n.w., on the Posen frontier. The Insurrection Committee continued to guide the revolt by issuing proclamations from time to time; and many districts of Augustovo, Radom, Lublin, Volhynia, and Lithuania, were speedily in insurrection. It was a mere guerilla war, and no great or decisive conflicts took place; but the sympathy of Europe was largely enlisted on behalf of the Poles. Remonstrances from Spain, Sweden, Austria, France, and Britain, conjointly and repeatedly, and from Italy, the Low Countries, Denmark, and Portugal, were wholly disregarded by the czar's ministers, and mutual reprisals continued; incendiarism and murder were rampant; the wealthier Poles were ruined by fines and confiscations; and the whole populations of villages were put to the sword by the Russians; while murders and assassinations marked the reign of terror of the National Committee. At last, with the officious assistance of Prussia, and the secret sympathy and support of Austria, the czar's troops succeeded in trampling out (1864) the last embers of insurrection. Great numbers of men, women, and even children, were put to death; crowds were transported to Siberia; and these vigorous measures seem to have restored 'tranquillity, but it is the tranquillity of the desert.' Contemporary with this last outbreak, symptoms of similar disaffection were distinctly noticeable in Prussian P., but a strong force of soldiery in the border districts toward Russia prevented any outbreak. It is noticeable that, except the single revolt of 1846 (which

perished almost of itself), no rebellion has ever taken place in the portion of P. belonging to Austria.

POLAND, Kingdom of, or Western Russia: province of European Russia, created in 1815 by the Congress of Vienna and united to Russia under a separate form of government, which it retained until 1864 (see Poland), when it was deprived of the last semblance of administrative independence. It is surrounded by Prussia, Austria, and Russia; area 49,157 sq. m. Pop. (1897), 9,455,943. The pop., about 170 to the sq. m., is more than three times as dense as that of the rest of European Russia. The population consists mostly of Poles, with about 1,000,000 Russians, 1,500,000 Jews, 250,000 Germans, and 300,000 Lithuanians; 79% are Roman Catholics, 14% Hebrews, leaving only 7% Protestants and Greek Catholics. The surface of the country is in general very level, with now and then an undulation. In Radom, however, there is a range of hills, some of which rise 2,000 ft. above sea-level. The chief river of P. is the Vistula, which enters the country by its s. boundary, and flows first n. and then n.w., making its exit near Thorn; two of its tributaries, the Wieprz and the Pilica, belong wholly, and a third, the Bug, partially, to Poland. The Warta, one of the tributaries of the Oder, drains the w., and the Niemen the n.e., districts. The Vistula and the Niemen are wholly navigable in P.; and the Bug, Narew, and Warta are so for a considerable portion of their course. By these means of communication, the exports of the country are collected at Danzig, Stettin, Memel, and Tilsit, on the Baltic, and the imports introduced into the country. The climate is severe, the summers being very hot, and the winters excessively cold. The soil very much resembles that of the other parts of the former kingdom of Poland, producing magnificent crops of wheat, rye, barley, oats, and buckwheat, the usual leguminous plants, hemp, tobacco, flax, and orchard-fruits. More than 13,000 sq. m. are covered with forests, and fully 8,000 sq. m. waste. There are also iron, copper, tin, zinc, and coal mines. A large proportion of the country people employ themselves in rearing and breeding of horses, cattle, and pigs; sheep are not so common; swarms of bees abound, and there is large export trade in honey. The people of the towns are employed largely in wool-spinning and manufacture of woolen cloth, cotton and linen spinning and weaving, production of liquors, oil, vinegar, glass and earthenware, paper, beer and porter, etc. The manufacture of beet sugar is considerable, exceeding that of all the rest of Russia. The total annual production of all industries, including mining, is $212,500,000, and the total number of manufactories is 30,000, with 250,000 workers. Since 1867, Poland is divided for administrative purposes into 10 governments, viz.: Kalisz, Kielce, Lomza, Lublin, Piotrkov, Plock, Radom,

Siedlce, Suwalki, Warsaw. After the suppression of the revolt in 1864, the country was placed under eight military governors; 1867 the administration was committed to a commission sitting at St. Petersburg; and 1868 the govt. of P. was absolutely incorporated with that of Russia. The language of government and education is Russian. There is a university in Warsaw, besides lyceums for boys and girls, 3,026 public schools, and many other schools and colleges. In 1899 there were nearly 70 newspapers, published under a strict censorship.

POLAR, a. *pō'lėr* [F. *polaire;* mid. L. *polaris*, polar —from L. *polus;* Gr. *polos*, the end of an axis, a pole —from *pelein*, to be in motion]: pert. to one of the poles of the earth; situated near one of the poles; proceeding from the regions around either pole. POLAR ANGLE, on the *terrestrial sphere*, the angle at the pole formed by two meridians; on the *celestial sphere*, the angle at the pole formed by two hour-circles. POLAR BEAR, a species of bear inhabiting the arctic regions, having a silvery-white fur tinged with yellow. POLAR CIRCLES, the two parallels of latitude encircling the poles, each at a distance of about 23° 28′—the *north polar circle* is called the *arctic circle*, (see ARCTIC), and the *south* the *antarctic circle*. POLAR DISTANCE, the angular distance of a heavenly body from the elevated pole of the heavens. POLAR CLOCK, optical instrument invented by Sir Charles Wheatstone, by which the hour of the day is indicated by means of the Polarization of Light (q.v.). POLARIM'ETER, n. *-ĭm'ĕt-ėr*, instrument for measuring the deflection of polarized light. POLARISCOPE, n. *pō-lăr'ĭ-skōp* [Gr. *polos*, a pole; *skopĕō*, I see]: instrument for detecting polarized light, or for testing its amount and exhibiting its phenomena; there are several kinds of these instruments, and what is called the analyzer in a polarizing apparatus performs a similar work (see POLARIZATION OF LIGHT; also SACCHARIMETER). POLARIZE, v. *pō'lėr-īz*, to render incapable of exhibiting the ordinary phenomena of reflection and transmission—applies to rays of light when acted upon by certain media and surfaces. PO'LARIZING, imp.: ADJ. effecting polarization. PO'LARIZED, pp. *-īzd*: ADJ. affected by polarization. PO'LARIZER, n. *-īzėr*, that which polarizes. PO LARIZABLE, a. *-ī-zā-bl*, capable of being polarized. POLARIZATION, n. *pō'lėr-ī-zā'shŭn*, the act of polarizing; the state of being polarized, or of having polarity. POLARITY, n. *pō-lăr'ĭ-tĭ*, the having two poles opposite, with variations in certain physical properties correspondent with the two opposite directions: property possessed by certain bodies of pointing, when freely suspended, toward the poles of the earth, or in certain determinate directions (see below). POLARY, a. *pō'lėr-ĭ*, that tends or points to a pole.

PO'LAR EXPEDI'TIONS: voyages of discovery toward the n. and s. poles, and to the regions within the Arctic and Antarctic Circles. The n. polar regions present a much greater land-surface than those round the s. pole; thence they have a higher temperature, and offer a more valuable field for discovery, for which reasons, as well as their greater proximity, they have attracted the greater number of polar expeditions.

Arctic Expeditions.—Polar expeditions originated in the search for a shorter route to the Far East, but the first attempts were made by coasting along the n. of Europe and America: see NORTHEAST and NORTHWEST PASSAGES. The earliest expeditions were sent out by the Muscovy Company and comprised the well known voyages of Stephen Bennett, Henry Hudson, Jonas Poole, Fotherby, and Baffin, undertaken at various periods between 1603 and 1615. The expeditions attempting the seas to the n. of Spitzbergen were baffled by the ice, so that except for the discovery of a n. outlet to Baffin Bay, no great progress toward discovering the eastern route sought, was made. For the next century and a half attempts to reach the n. pole were not resumed, but in George III.'s reign the marked zeal in naval discovery which sprang up, induced two renewed efforts. The first of these was made in the spring of 1773 by an expedition under Capt. John Phipps, and fitted out for purely scientific purposes. The highest point attained by him was 80° 48′ n. less by 49 m. than the most northerly lat. attained by Hudson, and his failure, with that of Capt. Cook, who attempted to reach the pole by Behring Strait, greatly disheartened other explorers. The offer of £5,000 by the British Parliament to the crew that should penetrate to within 1° of the pole awakened no competition; but William Scoresby, then, 1806, mate of a Greenland whaler from Hull, reached a point directly north of Spitzbergen, in lat. 81° 30′ n., and thereafter, in later expeditions made many geographical explorations of Jan Mayen's Land and the e. coast of Greenland, largely adding to the world's knowledge of the character and products of the Arctic regions. The subsequent expeditions of Buchan and Franklin 1818, of Clavering 1823, of Graab (Danish) 1828, of De Blosseville (French) 1833, may be considered fruitless for geographical discovery. After the failure of Buchan and Franklin's expedition, the impossibility of ever reaching the pole was generally accepted as fact; but Scoresby, in a Memoir which he communicated to the Wernerian Soc., endeavored to disprove this supposed impossibility, and to show that a journey to the pole might be made without any insurmountable difficulty or danger. The principal obstacle being the alternation of ice-fields and water, Scoresby proposed the use of a vehicle which could be used as either sledge or boat, recommending a team of dogs to draw it, they being lighter (for conveyance by water, and for travelling

over thin ice) and more tractable than reindeer. This suggestion finally receiving attention, Capt. Parry (celebrated for his discoveries in the polar seas n. of America) was put in command of an expedition fitted out in accordance with Scoresby's plans, and sailed from England in the *Hecla*, 1827, Mar. 27. The advantages of the new style of outfit which enabled them to leave their ship in harbor and continue in sledges over the ice, were counterbalanced by the peculiar difficulties they encountered, and after reaching lat. 82° 40′ Capt. Parry gave up further quest, returned to his ship and sailed for home. A new land, about 200 m. n. of Nova Zembla, to which the name Franz Joseph Land has been assigned, was discovered by the Austro-Hungarian Polar Expedition of 1872-74, under Lieutenants Weyprecht and Payer. Its s. coast lies about the 80th parallel, and it was explored, by means of sledges, up to 82° 5′ n., while land was seen extending as far as 83° n. In 1853 Elisha Kent Kane, in the *Advance*, reached lat. 78° 43′ in Smith's Sound, the highest lat. ever till then reached by a vessel in that sea. On the same expedition, Morton discovered Kennedy's Channel, and reached as far n. as Cape Constitution, 82° 27′ n. Hayes, 1860, continuing the exploration of Smith's Sound, reached 81° 35′ by sledge. The *Polaris*, bearing Capt. Charles Francis Hall, steamed without difficulty, 1871, through Smith's Sound into Kane Sea, and through Kennedy and Robeson channels to the Polar Sea; the *Polaris* reached lat. 82° 11′ n. Aug. 29. An English arctic expedition under Capt. Nares 1875-6 reached, through Smith's Sound, the highest latitude till then attained, 83° 20′. Lieut. Lockwood and Sergt. Brainerd, of the American Arctic Expedition, 1883, under Lieut. Adolphus W. Greely, U.S.A., reached 83° 24′. Of the party of 25 who landed at Discovery Harbor (lat. 81° 44′ n., long. 64° 45′ w.) with Greely, 1881, Aug. 12, only 6 were alive when the relief ships under Commander Schley came to the rescue, 1884, June 22; the survivors could hardly have lived two days more had help not arrived. In 1894 five expeditions were being fitted out or were in the Polar Sea, and the most notable of these was that under Robert E. Peary (q.v.), a civil engineer in the United States navy. He had visited Greenland 1886, led an expedition 1891-2 fitted out by the Academy of Natural Sciences of Philadelphia, and started 1893 for a two years' stay, returning to St. John's, Newfoundland, 1895, Sept. 21. His explorations added much at the time to the geographical knowledge of the region. Dr. Frithjof Nansen, of Norway, who sailed in the *Fram* in 1893, returned in 1896, having attempted to find the pole by the drifting method. He reached n. lat. 86° 14′. In 1897 Solomon A. Andree, a Swede, with two companions, left Dane's island n. of Spitzbergen in a balloon, hoping to drift across the pole, but no definite information concerning them was ever

received. In 1898 five expeditions set out. Capt. Otto Sverdrup, in Nansen's ship the *Fram*, left in June and returned 1902, Sept. 19. He discovered what was believed to be the farthest land lying between the American continent and the pole w. of Greenland; a great island north of the Parry islands. Peary, 1898–1902, explored and mapped large parts of Ellesmer Land and Grinnel Land, rounded the northern coast of Greenland, and reached lat. 84° 17′. In 1899, June, the Duke of Abruzzi led an expedition in the *Stella Polari*. Some of his party in sledges reached (1900) lat. 86° 34′ n. On July 16th, 1905, Peary set out for his fifth attempt to reach the pole. His vessel, the *Roosevelt*, was designed by Naval Architect William E. Winant particularly for arctic exploration. Peary returned November, 1906, after reaching the highest lat. yet attained, 87°

Map showing points reached by Peary and other North Pole explorers.

6′, in the quickest time on record after leaving for the arctic. His feat of sledging, in striking out from the promontory of Grant Land and making a northing of 400 m. over the rough ice of the North Polar Sea, is without parallel in Arctic annals. Between 84° and 85° his journey was delayed by open water, and when he was probably about 200 m. from land the ice pack on which he was sledging was disrupted by a gale and he drifted east to the coast of Greenland, whence he returned to the winter quarters of the *Roosevelt*. In

June, 1903, Capt. Roald Amundsen in his ship the *Gjoa*, left Christiania, Norway, and in November, 1906, arrived at Nome, Alaska, after having at length accomplished the navigation of the Northwest Passage. His primary undertaking was to relocate the magnetic north pole, so in setting out he had gone as directly as possible to its vicinity, where, with the aid of his lieutenant, he spent nearly two years in recording observations, and having at last assured himself that he had established the exact location of the magnetic north, he continued his trip through the Northwest Passage, and on Aug. 30th, 1906, sailed through Behring Strait with the Norwegian flag at his masthead. For this achievement the Grand Cross of the Olaf Order was bestowed upon Capt. Amundsen by King Haakon of Norway, and the prize deposited with the English govt. for the first man to effect the N. W. Passage, became due him. Walter Wellman, who in 1894 reached lat. 81° n.e. of Spitzbergen, and in 1898-9 led an expedition to Franz Josef Land, discovering many new islands, and reaching lat. 82°, announced, in December, 1905, his intention of attempting to reach the pole by dirigible airship. He was encouraged in his idea by scientific societies and individuals, and by April, 1906, the work on his aeronef was well under way, and Mr. Wellman had made plans to sail for Spitzbergen in June, carrying the airship in his ice steamer the *Frithjof*. At that point, as headquarters, about July 1st his idea was, to inflate the aeronef and make his dash for the pole from there. He expected to be able to make the distance there by dirigible in 10 days, and his machine was so constructed as to be especially likely to avoid such disaster as befell the unfortunate Andree, whose balloon had had the further disadvantage of not being dirigible. At the time set for the actual experiment, however, July, 1906, it was found that from unforeseen difficulties with the gas inflation in that temperature, the attempt had to be abandoned for the time being.

Antarctic Expeditions.—The attempts to penetrate to the s. pole are of very recent date, mainly because a knowledge of the s. polar regions is valuable to Europeans for science only. Cook and Furneaux are the first navigators known to have crossed the Antarctic Circle, but the former penetrated only to lat. 71° 10′ s., and neither made any discoveries of importance. Bellinghausen, Russian navigator, reached lat. 70′ s. 1819; and two years later discovered Alexander's Land and Peter's Land, then the most southerly islands known. In 1823 Capt. Weddell reached lat. 74° 15′ s., long. 34° 16′ w., and saw beyond him an open sea to the south, but made no important additions to geographical knowledge. In 1831 Capt. John Biscoe discovered Enderby Land; 1839, the sealing-schooner *Eliza Scott*, from New Zealand, discovered Sabrina Land (q.v.); and in the same year was sent out the U. S. expedition under Capt. Wilkes,

which resulted in the discovery 1840, Jan., of what he with reason supposed a continuous coast-line though an ice-line 8 to 12 m. in width prevented him from establishing its continuity beyond dispute. The (supposed continental) coast stretched from Ringold's Knoll on the e. to Enderby Land on the w., and was distinguished by absence of currents to disturb the ice-barrier, and by a much less precipitous character than is usual with islands. In 1840 a French expedition under D'Urville discovered a line of coast directly s. from Victoria (Australia) on the Antarctic Circle. But the most important discoveries were by Capt. (afterward Sir James) Clarke Ross, who made three voyages 1841-43, discovering Victoria Land (q.v.), and tracing its coast from lat. 71° to lat. 78° 10′ (the highest s. latitude ever attained). In his third voyage Ross proved that the lands discovered by D'Urville were islands of no great size; and his expedition supplied also much important information in nat. history, geology, and especially Magnetism (q.v.). Ross's geographical discoveries have since been confirmed.

What was denominated the most important geographical discovery in the Antarctic region since Ross traced a part of the coast of Victoria Land, was that made by Capt. Larsen, a Norwegian whaler, while seeking seals, 1893, Nov.-Dec. The publication of his thrilling log in the *Scottish Geographical Magazine* excited intense interest among geographers and scientists. But the modest address of a young Norwegian explorer, C. Egeberg Borchgrevinck, at the Sixth International Geographical Congress, in London, England, 1895, Sept., proved a far greater sensation. He had accompanied Larsen as a seaman, intending if possible to explore the region. He confirmed the points of information in Larsen's log, and detailed his individual experiences, exhibiting maps, and calling attention to many errors in the popular understanding of that region. In 1898 he led out an expedition, and in 1900 returned, having reached the farthest point, 78° 50′ s. and 195° 50′ e. In 1898 a Belgian expedition under Capt. de Gerlach discovered 500 m. of new land. A German expedition under Prof. von Drygolski, 1901-03, discovered new land. In 1901 British and Scottish expeditions were sent out.

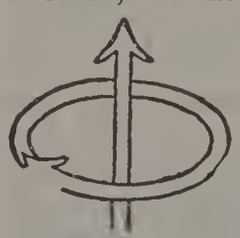
POLARIS, *pō-lā′rĭs*, in astronomy, the star *a* of the constellation Ursa Minor. It is at present near the north pole, and many centuries must elapse before precession will cause the north pole to be defined by any other star. Two stars called the pointers, in the constellation Ursa Major (the Great Bear, commonly called the Plough), always point in the direction of the pole-star, and enable it to be found readily. See POLE STAR.

POLARISCOPE, *pō-lăr'ĭ-skōp:* instrument for determining the action of liquids on polarized light, and thus determining their contents of the polarizing ingredient. It is usually employed for analyzing sugars, the polariscope test being adopted by the U. S. govt. for determining duties on sugars. See SACCHARIMETER.

A tube like a short telescope is mounted horizontally on a stand. Its centre has a place for a glass-capped tube about 6 inches long, in which the sugar solution is placed. The telescope has at one end a polarizer which transmits through the apparatus the ordinary polarized ray, the extraordinary being refracted out of the field. This ray then passes through two quartz plates placed side by side, by which it is subjected to rotary polarization, both right and left-handed; one way for its right-hand and the other for its left-hand portion. The composite ray passes through the solution. As this has a rotary polarizing power, it adds to the polarization of one-half of the beam, and subtracts from that of the other so that the spot or disk of light seen through an analyzer in the eye-piece has two colors. Between the end of the liquid-containing tube and the observer are a pair of wedge-shaped quartz plates; by sliding these over each other, their aggregate thickness is increased or diminished until both halves of the disk, as seen through the doubly-refracting prism or analyzer in the eye-piece, appear of one color. This occurs when the thickness of the quartz plates is such as to exactly compensate for the liquid in the tube. A vernier is provided by which the position of the wedge-shaped quartz plates can be read off, and this is graduated so as to show the rotatory power of the liquid. By using (in the saccharimeter) definite weights of sugar and water for the solution, the readings are made to correspond to percentages. There are several refinements, omitted in this description; and the different types of polariscope present several variations. The above gives an idea of the leading features of construction. The P. is applied sometimes in medical practice to determine the percentage of sugar in diabetic urine.

POLARITY: the having two poles opposite. The n. and s. poles of the earth's axis are familiar terms; and so are the derived terms of the n. and s. poles of a Magnet (q.v.). A right-handed and left-handed corkscrew, or helix, also are well known. The distinction between the members of any of these pairs leads us to the consideration of P., which it is difficult to define except by illustrations. In the case of the helix, it is the difference between right-handed and left-handed; not as in a magnet, the difference between the two ends. If we look closely into the question, we find that it is impossible to define the term 'right-handed rotation' in the abstract. We may define it as being the same as that of the hands of a watch, or that of the apparent motion of the celestial bodies about us *in this northern hemisphere;* but to a person at the equator, or to one who had never seen a watch, such comparisons would be without meaning. In fact, it is impossible to give a definition of even such a simple term as *right* (*hand*). *east. down,* etc.;

independent of reference to the motion or position of some external object. But there is, in many cases, an important scientific reality underlying, perhaps causing these difficulties. To a spectator looking down upon the n. pole of the earth, the axial rotation would appear to be left-handed, or opposite to that of the hands of a watch; while at the s. pole the appearance is the reverse. In fact, as motion in a horizontal straight line appears to be from right to left, or from left to right, according to the side on which the spectator stands; so motion in a curve appears to be right-handed or left-handed, according to the side of its plane from which it is looked at. And this is now known to be the cause of the difference of poles in a magnet; the hypothesis of two magnetic fluids is dismissed, and Ampère's explanation, that in a magnet currents of electricity revolve round each particle in planes perpendicular to the direction of magnetization, at once accounts for the dissimilarity of the poles. Such a figure as this gives a clear idea of the subject. A little electric current, such as that in the figure, in which positive electricity passes in the direction indicated by the arrow-head, acts on external bodies exactly as a small magnet would whose axis is, as in the cut, perpendicular to its plane, the arrow-head representing the *north* pole; that is, the pole which turns toward the *South*. Again, an electric current passing in a straight wire would at first sight appear altogether independent of polarity; yet it is found that such a current moving in the *straight* line in the cut, in the direction of the arrow-head, tends to make the *north* pole of a magnet rotate round it in the direction indicated by the arrow-head in the circle. Again, there are certain crystals, which, when heated, become electric. One end of a prism of tourmaline, for instance, takes positive, the other negative electricity. Also certain crystals of quartz cause a ray of polarized light, which passes along their axis, to rotate right-handedly; others left-handedly. The difference in these cases is due to molecular arrangement, other effects of which are easily seen in the tourmaline, in the dissymmetry of the two terminals of the prism, and, in quartz, in the position of certain small faces of the crystal, so that a preliminary inspection enables us to predict the direction of the effect to be obtained from any particular specimen. The term has various other applications, among the least defensible of which is that to light: see POLARIZATION OF LIGHT.



POLARIZATION OF LIGHT.

POLARIZA'TION OF LIGHT: change produced on rays of light by the action of certain media through which they pass, or by the action of certain surfaces which reflect them, so that the rays come to be no longer uniform, but have different properties in different directions. A ray of light from the sun or a lamp, which has not been reflected or refracted in its course to the eye, possesses no properties by which one *side* of it can be distinguished from another; if, e.g., it be divided into two by a colorless doubly-refracting crystal, such as Iceland spar, these two rays will be of apparently equal intensity in whatever position the crystal be placed (see REFRACTION, DOUBLE). But if the ray has been reflected from a surface of glass or water, it is found that in general the intensities of the two rays into which it is divided by the doubly-refracting crystal are not only unequal, but dependent on the position of the crystal with reference to the plane in which the light was previously refracted or reflected. This is conclusive proof that the light has undergone some change by reflection or refraction, so that it is no longer the same all round, but possesses *sides* (in the language of Newton), or (in modern phraseology) is *polarized*. Perhaps the most complete illustration of this very important fact is found by using two doubly-refracting bodies—two small crystals of Iceland spar, e.g.—and pasting on a side of one of them a slip of paper with a pin-hole in it. Looking through this crystal, the covered side being turned toward a bright body, we see two images of the pin-hole, *equally* bright. Look at these through the second crystal, each is in general doubled; we see four images of the pin-hole, but these are generally *unequal* in brightness; and by turning either of the crystals round the line of sight as an axis, we find that there are positions, at right angles to each other, in which only *two* images are visible. If we turn further, the lost images appear faint at first, and gradually become brighter, while the others become fainter in proportion; till, when we have completed a quarter of a revolution, the new images alone remain, the others having disappeared. From this it follows that each of the rays into which a single beam of light is decomposed by double refraction possesses *sides*, or is polarized; and to such an extent as to be incapable of being again doubly refracted in certain positions of the second crystal. By taking advantage of the difference of the refractive indices (see REFRACTION) of the two rays produced by Iceland spar, and the close agreement of one of them with that of Canada balsam, Nicol constructed his 'prism,' one of the most useful pieces of polarizing apparatus. It consists of two pieces of Iceland spar cemented with Canada balsam, and *allows only one of the two rays produced by double refraction to pass through.* When we look at a flame through two Nicol's prisms in succession, we find that the amount of light transmitted depends on their relative position. If they are *similarly* placed, we have the maximum amount—viz., half the incident light; if they are *crossed*, i.e., if one be made to rotate through a right angle from the position last men-

tioned, *no* light, not even the most powerful sunlight, can pass through the transparent combination. There are certain doubly-refracting bodies, e.g., tourmaline, iodosulphate of quinine, etc., which by absorption stifle one of the two rays into which they divide a beam of light; and which act therefore precisely as Nicol's prism does. But they have the great disadvantage of *coloring* the transmitted light very strongly; and this renders them unfit for the study of the gorgeous phenomena of color (perhaps the grandest displays in optics) produced by polarized light. But for the verification of the facts to which we now proceed, a tourmaline or a Nicol's prism will do equally well, and will be called the analyzer. And first as to the reflection of light, a cause of polarization first detected by Malus. If we examine by the analyzer light reflected from water, unsilvered glass, polished or varnished wood, jet, etc., we find that it is more or less completely polarized; but that there is a particular angle for each substance, at which if light be reflected (see REFLECTION) from its surface it is completely polarized; that is, can be completely stopped by the analyzer in certain positions, just as a ray which has passed through a Nicol's prism. It was discovered by Brewster that this angle, called the *polarizing angle*, has its tangent equal to the index of refraction of the reflecting body: or, in another form, the reflected light from a surface of glass, water, etc., is completely polarized when its direction is perpendicular to that of the corresponding refracted ray. The light reflected from the second surface of a glass plate is also completely polarized at the same angle; and one of the most useful polarizers which can be made is a pile of thin glass plates, from the surfaces of which light is reflected at the proper angle, which is for ordinary window-glass about 54°. The light which passes through the glass plates is partially polarized, and its polarization is more nearly complete the greater the number of plates employed. And it appears that these rays are polarized in planes perpendicular to each other—i.e., that the analyzer which extinguishes the reflected ray has to be turned through 90° to extinguish the refracted ray.

In order that we may arrive at some ideas as to the nature of polarization, we must consider on the basis of the Undulatory Theory of Light (q.v.) *how* a ray of light can have sides. If we take, for a comparison, waves of sound, on the theory that in them (see SOUND) the particles of air move forward and back in the line in which the sound travels, we see that a beam of sound cannot possibly have sides, since the motions of the particles of air in it are precisely the same from whatever side we consider them. Next take waves in water, where we see the water rising and falling as the undulation (*not* the water) travels uniformly onward in a horizontal direction; and this at once gives the required analogy. So far as phenomena of Interference (q.v.; see also DIFFRACTION) are concerned, waves, whether in air or in water, present them, so that they show us merely that light depends on undulations, but not the kind

of undulation. But when, from the facts of polarization, we find that a ray of light can have sides, we see that the vibrations of the luminiferous medium must be *transverse to the direction of the ray*. Common light, then, consists of vibrations which take place indifferently and in succession in all directions transverse to that of the ray; while light completely polarized has its vibrations limited to a *particular* transverse direction. A Nicol's prism allows no light to pass through it except that which vibrates in a particular transverse direction, depending on the position of the axes of the pieces of Iceland spar of which it is made. Light which has passed through one Nicol's prism is sifted so as to contain none but such transverse vibrations, and will of course pass freely through a second prism, or be completely or partially stopped by it; according as the two prisms are similarly situated, or turned so that the directions of the vibrations that they can transmit are inclined at right angles, or at any other angle.

It is not yet settled what the direction of these vibrations is in any particular case; whether they take place *in*, or *perpendicular to*, the plane of polarization; and the point is extremely important in the theory of the subject, though not to the explanation of the ordinary experimental results. To explain the nature of this difficulty, we merely mention the simple case of polarization by reflection at a glass plate. Do the vibrations of the reflected ray take place *perpendicular to* the plane of reflection (i.e., parallel to the reflecting surface), or do they take place *in* the plane of reflection? Some high authorities are in favor of the latter hypothesis, but the general opinion of scientific men at present unquestionably leans to the former. Many delicate experiments have been made to decide the question, but their results have been irreconcilable with each other. From the results above arrived at, it is evident that the oscillations, or vibrations of the luminiferous medium, of which light consists, are similar to those of the bob of a Pendulum (q.v.), the ray in this case being supposed to proceed vertically downward. Polarized light consists of vibrations analogous to those of the ordinary pendulum, forward and backward in a line. But we have seen that any motion of the pendulum may be compounded of two such motions in planes perpendicular to each other. This is analogous to the decomposition of common light by a doubly-refracting crystal into two rays polarized at right angles. But we find in nature, and can produce artificially, motions of the luminiferous medium resembling exactly the elliptic, and circular, motions of the (conical) pendulum. They occur in nature in all cases of reflection from metallic surfaces, also from the surfaces of highly refractive bodies, such as diamond, etc. The easiest artificial method of procuring them is to allow polarized light to pass through a thin plate of a doubly-refracting crystal, such as a film of mica. Thus, if OA be the direction of vibration of the polarized light, the ray moving perpendicularly to the paper, O*a*, O*b*, the directions (at right angles to each other) of vibration of the

two rays into which it is divided by the mica, we have only to let fall from A perpendiculars on O*a* and O*b* to determine the extent of the resolved vibrations in these directions. Now if the two rays moved equally rapidly through the mica, they would simply recombine on leaving it into a single plane polarized ray, whose vibrations would be represented by OA as before. But, in general, one of the rays is retarded more than the other, and the combination of two such oscillations is seen by geometrical considerations to give an ellipse whose centre is at O, and which touches each side of the rectangle of which A*a* and A*b* are half sides. The limiting forms of these ellipses are, of course, the diagonals of the rectangle; so that there are two cases for the light remaining plane polarized after passing through the mica, for an infinite number in which it will be elliptically polarized. Also the difference of retardation of the two rays may be such as to correspond to a description of these ellipses either right-handedly or the opposite. In particular cases the ellipse may be a circle; then it is obvious that the rectangle must become a square, that the directions of vibration of the two rays in the mica must be equally inclined to that of the original polarized ray, and that one ray must be retarded an odd number of quarter oscillations more than the other. If it be 1, 5, 9, etc., quarter oscillations, the rotation is in one direction; if 3, 7, 11, etc., it is in the opposite. Circularly polarized light cannot be distinguished by the eye, even with the help of a Nicol's prism, from common light; but by interposition of a thin plate of a doubly-refracting crystal, phenomena are produced which common light cannot give. Before leaving this part of the subject, it is to be remarked that the composition of two equal and opposite circular vibrations produces a plane vibration, whose plane depends on the simultaneous positions of the revolving bodies in their circular orbits. Hence a plane polarized ray may always be considered as made up of two circularly polarized rays, and if these pass through a medium which retards one more than the other, the plane of polarization of their resultant, when they leave the medium, will in general not be the same as that of the incident ray. In other words, the plane of polarization will have been caused to rotate through a certain angle proportional to the difference of retardation of its circular components. This is the explanation of what Biot called *Rotatory Polarization* in quartz, turpentine, sugar, etc., and of the rotation of the plane of polarization discovered by Faraday when a polarized ray passes through a transparent body under the action of a magnet.

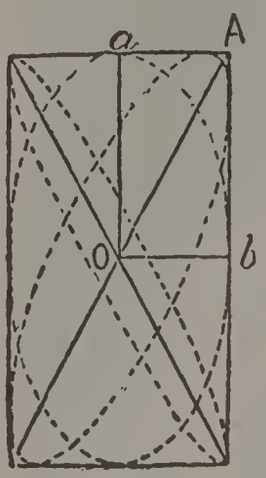


Fig. 1.

In the first of these cases, the retardation is due to molecular heterogeneity; in the second, it depends on molecular motions produced by the magnet. The effect is

greater in each case the more refrangible the rays; therefore, when the light which has passed through the medium is examined with an analyzer, the successive colors of the spectrum are cut off each at a different angle, and the observed tint is that compounded of those which remain. The Saccharimeter (q.v.), for the determination of sugar in a liquid, is an application of the first case; the second has not as yet been applied to any practical purpose, but it has given most valuable information as to the ultimate nature of magnetism.

When polarized light passes through a slice of any uniaxal double-refracting crystal, nearly in the direction of its axis, it is obvious that the difference of retardation of the two rays into which it is divided will depend only on (1) their refrangibility, (2) their inclination to the axis of the crystal. Hence, if we suppose the light homogeneous, the effects of interference, and subsequent application of the analyzer, must be to produce appearances of bright and dark spaces, symmetrically disposed round the axis; that is, a series of concentric circular rings. The superposition of the separate sets of rings, for each color of the spectrum, produces the appearance actually observed; a series of colored rings, like those known as Newton's Rings, due to Interference (q.v.). Besides these, however, there is a dark or bright cross, consisting of two black or white

Fig. 2.—Uniaxal Crystal ; Black Cross.

bands, intersecting each other in the common centre of the rings. The dark bands are due to the absolute stoppage by polarizer or analyzer, when placed in positions 90° from symmetry, of all light whose vibrations are executed in the principal planes of the polarizer and analyzer. A similar explanation applies to any other case. The system of colored rings thus produced is one of the most splendid results of optical combinations; and may be seen by any one by the help of such simple apparatus as two fragments of window-glass and a piece of clear ice from the surface of a pond. In undisturbed freezing, the axis of the ice crystal is perpendicular to the surface of the water, and the cake of ice is therefore, as it were, cut for our purpose. If light be reflected at an angle of about 54° from the first

piece of glass, pass perpendicularly through the ice, and be again reflected (at 54°) from the second piece of glass, the phenomena above described, and rudely represented in the annexed cuts, will be at once seen, the appearances varying with the relative position of the planes in which the reflections take place from the pieces of glass. If these planes be at right angles to each other, we have the black cross as in the first figure; if parallel, the white cross as in the second.

Fig. 3.—Uniaxal Crystal; White Cross.

If, instead of a uniaxal crystal, a biaxal crystal, e.g., nitre or arragonite, be employed, the system of colored rings and dark brushes is more complex; symmetry now requiring their arrangement about the *two* optic axes. The general appearance of the rings and brushes depends now not only on the relative position of the polarizer and analyzer, but also on the position of the crystal (which is no longer symmetrical about an axis) with reference to these planes. The two following figures illustrate the nature of the change due to an alteration of the position of the crystal, the polarizer and analyzer being fixed in planes at right angles to each other.

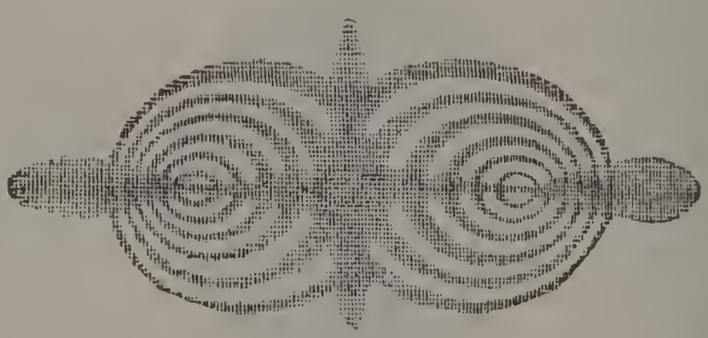


Fig. 4.—Biaxal Crystal; Black Cross.

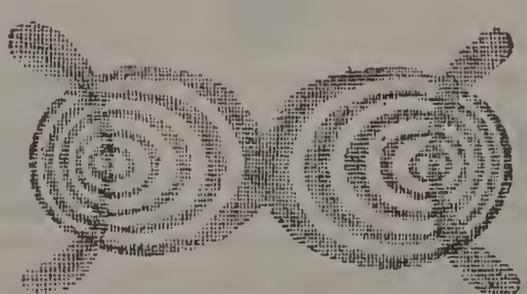


Fig. 5.—Biaxal Crystal; Black Cross changed to hyperbolas by rotating the crystal.

By employing circularly or elliptically polarized light, these appearances may be still further varied.

Every doubly-refracting body produces a change on polarized light which passes through it. Hence the application of the polarizer and analyzer (usually glass mirrors, or Nicol's prisms) to the microscope is often of very great use

in detecting crystalline, and other structural peculiarities. Solid bodies, e.g., glass, which are singly refractive, become doubly refractive when strained either by external forces or by unequal heating. A permanent state of strain is produced in glass when it is cooled quickly. All these phenomena are beautifully exhibited by polarized light. Again, the application of polarized light is sometimes of great importance in qualitative analysis, where only an exceedingly small quantity of a substance is procurable for examination, by enabling the chemist to determine whether a minute crystal is doubly refractive or not.

A practical application of a polarizing prism may be mentioned. In salmon spearing it is often exceedingly difficult to see the fish at the bottom of the stream, on account of the glare of light reflected from the surface. But as this light is always partially, sometimes wholly polarized, a great part of it may be arrested by the analyzer held in a proper azimuth; while the light escaping from the water will suffer little loss.

The light of the sky, being mainly reflected light, is of course partially polarized. The investigation of this subject has been most ably conducted by Brewster (*Trans. R. S. E.*, 1862–3).

POLDER, n. *pōl'dĕr* [Dut.]: in the topography of the Netherlands, land below the level of the sea or nearest river, which, originally a morass or lake, has been drained and brought under cultivation. An embankment, forming a canal of sufficient height to command a run toward the sea or river, is made, and when carried quite round, as in the case of the Haarlem Lake, it is called the *Ringvaart*. At one or more points on the embankment apparatus for lifting water is placed, and worked by wind or steam-power. If the lake deepens toward the centre, several embankments and canals are necessary, the one within the other, formed at different levels as the water-surface becomes lessened, a connection being maintained with the outer canal, which secures a run for the drainage water. In the Schermer polder, N. Holland, are four canal levels, the land between forming long parallelograms. The water from the inner space is lifted into the first canal; that again, with the drainage of the second section, is thrown into the second, and so on until the outer canal is reached, and a fall obtained. The Netherlands polders are very numerous. The Beemster, a rich district of N. Holland, water till 1612, is crossed at right angles by fine avenues, and dotted with farm houses and orchards, and has a pop. of 5,000. The Zype, Schermer, and Purmer are fertile polders, but the most important is the drained Haarlem Lake (q.v.). The land reclaimed amounted to 46,000 acres, and now maintains a pop. of 14,000. The soil is in some places sandy, in some loamy, elsewhere clay or peat, and differs much in fertility, some parts being positively barren. The chief products are grain, cattle, butter, cheese, seeds, flax, colza. The total outlay on the enterprise of draining was $5,248,800; but as the ground reclaimed sold for an aggregate of $3,790,800, the actual cost was only $1,458,000. On the

reclaimed area are four or five villages, and seven or eight churches. Several extensive tracts of land have been recently reclaimed from the Ij, and formed into valuable polders.—See DIKE.

POLE, n. *pōl* [AS. *pal*, a pole; L. *pālus*, a pole: Sw. *pale*, a stake: Ger. *pfahl:* W. *pawl*, a pole]: a long, slender piece of wood; a long staff; a measure of length, 16½ feet or ¼ chain; in *land-measures*, 30¼ square yards; a mast. BARE POLES, state of a vessel having all the sails closely furled or down: V. to furnish with poles. POL'ING, imp. POLED, pp. *pōld.*

POLE, n. *pōl:* a native of Poland.

POLE, n. *pōl*, plu. POLES, *pōlz* [F. *pôle*—from L. *polus*, the end of an axis: Gr. *polos*, a pivot on which anything turns—from *pelein*, to be in motion: It. *polo*]: the extremities of the earth's axis; the extreme points of the axis on which the celestial sphere revolves; in *geom.* and *astron.*, the extremities of an axis of rotation of a sphere or spheroid; in *spherics*, the extremities of the straight line perpendicular to the plane of the circle, and passing through its centre; the two points in a magnet in which chiefly appears the concentration of its attractive or repulsive energy. POLES OF THE EARTH, the two points in which the axis of the earth meets its surface. The northern one is called the north pole, and the southern the south pole. Each of these poles is 90° distant from every part of the equator. (See EARTH; POLES, in *geog.*). POLES OF THE HEAVENS, or CELESTIAL POLES (see POLES, in *astron.*). POLES OF THE HORIZON, the zenith and the nadir (see POLES below). POLES OF THE MERIDIAN, the points of the horizon due east and west (see POLES). MAGNETIC POLES, the two points on the earth, near the poles, at which the dipping-needle is vertical, or the magnetic intensity greatest.

POLE, CONSEQUENT. See ELECTRICAL MACHINES.

POLE, MAGNETIC. See MAGNETISM.

POLE, NEGATIVE. See BATTERIES ELECTRIC and ELECTRICAL MACHINES.

POLE, POSITIVE. See BATTERIES ELECTRIC and ELECTRICAL MACHINES.

POLE, SALIENT. See ELECTRICAL MACHINES.

POLE, UNIT MAGNETIC. See ELECTRO-STATICS and ELECTRO-DYNAMICS.

POLE, *pōl*, Cardinal REGINALD: 1500, Mar. 3—1558, Nov. 18; b. Stourton Castle, Staffordshire, England; son of Sir Richard Pole, Lord Montacute, by Margaret, Countess of Salisbury, daughter of the Duke of Clarence, brother of Edward IV. His early education was received from the Carthusians at Sheen, whence, being liberally provided for by the king, his relative, he passed to Magdalen College, Oxford, and having received deacon's orders, was advanced to several valuable prefer-

ments, through the favor of Henry VIII. For further study, he went to the Univ. of Paris, and thence to Padua, where he formed the friendship of a distinguished group of scholars and friends. In 1525 he returned to England, where the highest ecclesiastical dignities awaited his acceptance. But about this time Henry had resolved on the divorce from his queen Catharine, and Pole not only withheld his assistance from the project, but provoked the undying resentment of the king by his well-known treatise, *De Unitate Ecclesiasticâ*. His preferments and pension were withdrawn, and preparations were made for his impeachment. This, and probably still harsher measures, he evaded by withdrawing from England. The king's resentment fell instead on his elder brother, and on his aged mother, the Countess of Salisbury. During the rest of Henry's reign, Pole remained in exile. The pope, for the maintenance of whose authority, in the the cause of the injured Catharine, Pole was regarded as a martyr, treated him with distinguished favor, and elevated him to the cardinalate. He was employed in many affairs of highest importance, being sent as legate 1537 to France and the Low Countries, from both which states Henry VIII. in vain demanded his extradition. He was active also in the discussions on the Interim; and when the Council of Trent was opened, he was appointed one of the three legate-presidents who acted in the name of the pope, Paul III. (q.v.). On this pontiff's death 1549 Pole was almost elected to succeed. For some time after Paul's death, he resided chiefly in a monastery near Verona, until the accession of Mary called him back to active life, as the main instrument of the reconciliation of England with the papacy. 1554, Nov. 24, Pole solemnly entered London as legate and plenipotentiary of the Roman see, possessing in an equal degree the confidence of the queen. In his arduous charge, he acquitted himself with prudence, and (as is asserted by some) with singular moderation for those times. In the religious or politico-religious severities which marked the later history of Mary's reign, it is asserted by some that Pole had no share; others hold Pole as Mary's chief adviser equally guilty with her. He was created Archbishop of Canterbury 1556, and Chancellor of the universities of Oxford and Cambridge. The new pope, Paul IV., who was personally unfriendly to Pole, removed him from his legateship and charged him with heresy; and under this shadow Pole died, less than 24 hours after the death of the queen. He was author of treatises on the authority of the Roman pontiff and the Reformation of England, and of very many letters, of great interest and importance for the history of the time. His other works include *Liber de Concilio* (1562), and *A Treatise on Justification* (1569). Consult *Life* by Zimmerman (1893).

POLEAX, n., or POLEAXE, n. *pōl'ăks* [Dut. *bollen*, to fell, to knock down—from *polle, pol,* or *bol*, the head, and *ax* (see under POLL 1)]: ax for knocking one on the *poll* or head, now used in slaughtering cattle: an ax or hatchet with a long pole or handle. There were many varieties of this arm, passing from a great hand-ax to an ax-headed spear or halbert, several of the longer sorts bearing but little resemblance to an ax. In *nav.*, a boarding-hatchet used for boarding or resisting boarders—a hatchet with handle about 15 inches long, and a sharp point bending downward at the back opposite the blade.

Poleax.

POLECAT, n. *pōl'kăt* [Dut. *pool-kat,* a polecat —a supposed corruption of *foul-cat:* OF. *pulent*, stinking], or FITCHET (*Mustela putorius*, or *Putorius fœtidus*): quadruped of the Weasel family (*Mustelidæ*), referred usually to the same genus with the weasel, stoat, or ermine, etc. It is the largest Brit. species of the genus. The length of the head and body is about 18 inches, length of tail more than five inches, the form stouter than that of the weasel or of the ermine. Its color is a deep blackish-brown; the head, tail, and feet almost black, under parts yellowish, ears edged with white, and a whitish space round the muzzle. The hair is of two kinds—a short woolly fur, pale yellow, or somewhat tawny; and long shining hairs of rich black, or brownish-black, most numerous on the darkest parts. The nose is sharp, the ears short and round, the tail covered with longish hair. There is a pouch or follicle under the tail, which exudes a yellowish, creamy substance of a very fetid odor; and this odor is particularly strong when the animal is irritated or alarmed. Hence, apparently, its name *Foumart* (*Foul Marten*), with various provincial modifications, e.g.,

Polecat (*Mustela putorius*).

Fulimart, Thoumart, etc. The origin of the names P. and Fitchet is much more uncertain. Skeat suggests that it may be *pool-cat*—i.e., cat living in a hole or burrow, since the Irish and Gael. *poll*, Cornish *pol*, mean a 'hole' or 'pit,' as well as a 'pool.' The P. was much

more common in Britain in former times than now, and is almost extirpated from some districts. It is extremely destructive in the poultry-yard, the abundance present there inviting it to drink blood and eat brains, which seem to be its favorite luxuries. The rabbit is followed by the P. into its burrow, and its ravages among poultry are partly compensated by its destruction of rats.—The taming of the P. is easy if begun early: it has been trained for taking rabbits.—The skin is sold under the name *Fitch*, and is used as a kind of fur, similar but much inferior to that of the Marten (q.v.). To artists, the hair of the *fitch* or *fitchet* is well known as that of which their best brushes are made; the hairs used for this purpose being the long hairs above noticed, which grow through the lighter-colored fur of the animal.—The Ferret (q.v.) is asserted to be a tamed albino variety of the polecat.—A dark-colored kind of ferret is commonly regarded as a cross between the P. and the ferret, and is sometimes called the *Polecat-ferret*. The P. breeds in May or June, making its nest in an old rabbit burrow or similar hole, and producing four, five, or six young.—In N. America, the term P. is applied to any of the various species of Skunk (q.v).

POLEMARCH, n. *pŏl'ĕ-mârk* [Gr. *polĕmos*, war; *archos*, chief, leader]: in *anc. Athens*, the third archon, who presided in the court in which the causes of the *metoikoi* or resident aliens were tried; a military officer, originally the military commander-in-chief.

POLEMIC, a. *pō-lĕm'ĭk*, or Polem'ical, a. *-ĭ-kăl* [Gr. *polemikos*, warlike—from *polĕmos*, a battle, war: It. *polemico:* F. *polémique*]: controversial; engaged in supporting an opinion or system in opposition to others; disputative. Polem'ic, n. a disputant. Polem'ically, ad. *-lĭ*. Polemics, n. plu. *pō-lĕm'ĭks*, the art or practice of disputation—applied to theology.

POLEMONIACEÆ, *pŏl-ē-mō-nĭ-ā'sē-ē:* natural order of exogenous plants, allied to *Convolvulaceæ*, and containing more than 100 known species, natives of temperate countries, and abundant particularly in n.w. America. They are mostly herbaceous, with alternate and often pinnated leaves; regular hermaphrodite flowers; 5 cleft calyx; 5-lobed corolla; 5 stamens, springing from the tube of the corolla; ovary free, surrounded with a fleshy disk; style surmounted by a 3-cleft stigma; fruit a capsule with 3 cells, and 3 valves; the seeds often enveloped in mucus which contains spiral threads. Some of the species are favorite garden flowers, as *Polemonium cœruleum*, *Cobæa scandens*, and species of *Phlox*, *Ipomopsis*, *Gilia*, etc. None are of value otherwise. *Polemonium cœruleum* is known in gardens as *Jacob's Ladder;* its stamens project from the corolla. *Greek Valerian* (*P. reptans*) is but 6–10 in. high, with flowers only ½ in. wide. It is not supposed to be really the *polemonium* of the ancients, to which great medicinal virtues were ascribed by them.

POLEMOSCOPE, n. *pō-lĕm'ō-skōp* [Gr. *polĕmos*, war; *skopĕō*, I see]: a perspective glass contrived for seeing objects that do not lie directly before the eye; an instrument for seeing without being seen, so named by the inventor, under the idea that the instrument might be useful in time of war.

POLENTA, n. *pō-lĕn'tă* [It. *polenta*, polenta—from L. *polenta*, pearl-barley]: kind of pudding made from Semolina (q.v.), or Indian corn-meal, etc.; used as food by all classes in Italy. By the poorer classes, maize is universally used. The material is mixed with milk or water, and boiled until thick enough to pour into a dish, in which it becomes as firm as a thick jelly. Cheese is grated over it, other condiments are added according to taste, and it is cut out in slices, and either eaten at once, or sometimes the slices are lightly fried in oil or butter. P. prepared from Semolina is much more expensive; many ingredients are added to suit the taste.

POLES, *pōlz:* in *geography*, the two extremities of the axis round which the earth revolves; situated therefore one on the n., the other on the s. side of the equator, and equidistant from all parts of it; or in lat. 90° n. and lat. 90° s. They are called the n. and s. poles of the earth: the n. pole is the one to which the United States is nearest. In *astronomy*, the poles, for distinction frequently denominated 'celestial poles,' are those two points, north and south, in the heavens to which the earth's axis is directed, and around which the heavens seem to revolve. The celestial poles are valuable points of reference to astronomers and geographers, so that the determination of their position in the heavens is of the utmost importance. Unfortunately, no stars mark their exact situation (see POLE-STAR) —though there is a minute telescopic star only a few seconds from the n. pole, which may be employed instead of it in rough observations: therefore it is necessary to adopt some means for discovering its precise position. This is effected in the following manner: A bright star (generally the pole-star) is selected, and its position in its upper and its lower *Culminations* (q.v.) is accurately noted; the point midway between these two positions of the star is the pole of the heavens. The observation of the star's two positions must be corrected for refraction, and it is for this reason that the pole-star is selected, since the effect of refraction is much the same in both positions of the star.—The term 'poles' has also a wider application as denoting the extremities of a line passing through the centre of a great circle perpendicular to its plane; e.g., the poles of the horizon (viz., the zenith and nadir), the poles of the ecliptic, the poles of a meridian; and in the same sense, the terrestrial and celestial poles are spoken of as poles of the equator and equinoctial respectively.—In *geometry*, pole is used in a very indefinite sense. In *physics*, Poles are those points of a body at which its attractive or repulsive energy is concentrated: see POLARITY: MAGNETISM, TERRESTRIAL.

POLE-STAR, *pōl′stâr*, or POLARIS, *pō-lā′rĭs:* nearest conspicuous star to the n. pole of the celestial equator. The star now known as the 'pole-star' is the star α (Alpha) in the constellation Ursa Minor. Examining attentively the general movement of the stars throughout a clear winter's night, we observe that they describe circles largest at the equator, and becoming smaller and smaller toward a certain point (the n. pole of the celestial equator), close to which is the star above mentioned. This 'pole-star' is, however, a little less than $1\frac{1}{2}°$ from the pole, and has a small but sensible motion round it: see POLES. Because of the motion of the pole of the celestial equator round that of the ecliptic (see PRECESSION OF THE EQUINOXES), this star will in course of time (about A.D. 2100) approach to within 28′ from the n. pole, and will then recede from it. At the time of Hipparchus (B.C. 156) it was 12°, and 1785, 2° 2′ from the n. pole. Its place can easily be found in the heavens, for a line drawn between the stars α and β (called the two *pointers*, from this peculiarity) of the constellation Ursa Major, or the Great Bear, and produced northward about $4\frac{1}{2}$ times its own length, will almost touch the pole-star. 2,000 years ago the star β of Ursa Minor was the pole-star; and about 2,300 years before the Christian era, the star α in the constellation of the Dragon was not more than 10′ from the n. pole; and 12,000 years after the present time, the bright star Vega in Lyra will be within 5° of it.

The s. pole of the celestial equator is not similarly marked by the near neighborhood of a bright star, the only star deserving the name of the s. pole-star being of the sixth or least visible magnitude.

POLIAN′THES: see TUBEROSE.

POLICE, n. *pō-lēs'* [F. *police*, police: It. *polizia*; Sp. *policia*, police, cleanliness—from Gr. *politeï'a*, the state, system of government—from *polis*, a city]: that part of governmental superintendence which relates to internal regulations of a town, city, or state; a body of civil officers employed to enforce the laws respecting good order, cleanliness, etc. (see below). POLICED, a. *pō lēst'*, regulated under a system of laws administered by the police. POLICE OFFICER, or POLICE'MAN, one of the ordinary police; a constable. POLICE MAGISTRATE, a stipendiary judge who tries petty cases preferred by the police. POLICE STATION, the house to which offenders are taken in the first instance; the headquarters of the police, or of a section of them.

POLICE: civil force charged with maintaining the peace, preventing and detecting crime, and enforcing the laws. Though the word policeman is now, especially in towns, a household word, the legal denomination is that of constable.

The duties of constables or P. officers are exceedingly multifarious, and the officers receive printed regulations to guide them in the proper discharge of such duties. They have important duties in reference to the apprehension of offenders, and their powers are necessarily larger than those of private individuals. Wherever a person is seen in the act of committing a felony, it is the duty of every one, not merely of constables, to apprehend him or her without any warrant, for no warrant is needed. In case of a riot, anybody may arrest the rioter. P officers are bound to arrest violators of municipal ordinances, e.g., unlicensed venders (where the ordinances require a license), mendicants, etc., trading without a license; and vagrants who are offending against the Vagrant Acts. The powers of P. officers are much greater than those of individuals with reference to crimes after they are committed. Thus, where the officer has not seen the offense committed, but is merely told of the fact, and he has reason to believe it, he is entitled to arrest the party charged without any warrant; he must, however, in such cases act only on reasonable suspicion. He is not justified, e.g., in apprehending a person as a receiver of stolen goods on the mere assertion of the principal felon; nor is he justified in taking a person into custody for a mere assault without a warrant, unless he himself was present at the time the assault was committed, or reasonably apprehends a renewal of it. If a P. officer have reasonable suspicion that a man has committed a felony, he may apprehend him; and so may a private individual. The difference between the authority of the P. officer and the private person in this respect is, that the latter is justified only in case it turn out that a felony was in fact committed; but the officer may justify the arrest and detention whether a felony was committed or not. It is the duty of a P. officer to raise a hue and cry in search of a concealed or escaping felon, and all private individuals are bound to join in it, otherwise they may be indicted and fined. If the party arrested be in a house in hiding, the officer may demand admittance, and if he is refused, may then break open the doors; this is so in all

cases where the party has committed treason or felony, or has dangerously wounded another. An officer lawfully arresting an offender may use necessary force, but may not strike except in self-defense. In cases where the police officer is not authorized at common law or by some statute to arrest a party without a warrant, then he must produce a warrant signed by a justice of the peace, and show it to the party if it is demanded; and if the officer happens not to have the warrant in his pocket at the time, even though it is not asked for, it is an illegal arrest. When a party is arrested, it is the duty of the police officer to take him without any unreasonable delay before a justice of the peace or other magistrate, and meanwhile lodge him in safe custody. The party arrested must not be treated with harshness beyond what is necessary for safe custody, and therefore it has been held that a police officer has no right to handcuff a person whom he has apprehended on suspicion of felony, unless such person has attempted to escape, or it be necessary to prevent an escape. Nor has he in general a right to search a person apprehended, unless the latter conduct himself violently.

In the United States, each city or large village usually controls its own police force, subject to the laws of its state; in the rural districts the functions of the police force are supposed to be discharged by constables. The details of the police system in the several cities of the Union differ more or less, but in all essential particulars the system is identical in all. In New York City the police department consists of a commissioner (appointed by the mayor), four deputy commissioners, one chief inspector and 18 other inspectors, 23 surgeons, a superintendent and an assistant superintendent of electrical service, a chief and six other linemen, and two boiler inspectors. The regular force in the five boroughs of the city consists of 89 captains, 627 lieutenants, 585 sergeants, 7,772 patrolmen, 187 doormen, and 69 matrons, or a total of 9,329. In Manhattan and the Bronx there are 44 station-houses, one sub-station and one traffic station; in Brooklyn 33 station-houses and a branch of the detective bureau. There is a special squad of detectives, also a 'sanitary squad' to assist the board of health, a squad of harbor police and a squad of traffic police. The duty of the police force is to preserve the peace, prevent crime, detect and arrest offenders, suppress riots, protect the rights of persons and property, remove nuisances in public streets and places, repress disorderly houses, arrest vagrants, enforce all laws for suppression of crime, observance of Sunday, etc. Admission to the force is regulated by the civil service law.

In England and Wales the police force both municipal and rural is under the control of the central government, and the state contributes about half of the pay of

the men, except in the 'city' of London, where the whole cost devolves on the corporations. The total strength of the police in England and Wales is about 45,000 men. The total strength of the police force of Ireland (Irish constabulary) is about 12,500 men, viz., 'Royal Irish Constabulary,' nearly 11,300 men, and 'Dublin Metropolitan Police, about 1,200. The Irish police force is a semi-military body; the men always go armed and are drilled as soldiers.—The police force of Scotland (Scottish constabulary) numbers about 5,000 men.

POLICE, MILITARY: term with two significations—1st, the organized body employed within an army to preserve civil order, as distinct from military discipline; 2d, a civil police with a military organization. The police of an army consists usually of steady, intelligent soldiers, who act under the orders of the provost-marshal, and arrest all persons out of bounds, civilians not authorized to pass the lines, disorderly soldiers, etc.; they also attend to sanitary arrangements. As in all military matters, the police of an army possess summary powers, and a sentence of the provost-marshal is carried out immediately after it is pronounced.

Of civil police with military organization, specimens are—the Gendarmerie (q.v.) of France, the Sbirri of Italy, and in an eminent degree the Irish constabulary. In some great cities of the United States, the police, without forming any part in the military force, are organized and governed under military rules.

POLICY, n. *pŏl'ĭ-sĭ* [Gr. *politei'ă*, the state, system of government—from *polis*, a city]: the art, manner, or system of conducting public affairs professed by a party in the state; prudence or wisdom in rulers or individuals in the management of affairs; dexterity or art in management; management of affairs; prudence.

POLICY, n. *pŏl'ĭ-sĭ* [Sp. *poliza*, a policy: It. *polizza*, a note or schedule: violent corruption of the L. *polyp'tycha*, account-books, registers of taxes; Gr. *polup'tuchos*, that has many folds—from *polus*, many, and *ptux*, a leaf]: contract of insurance; written contract by which a company engage to pay a certain sum in the event of death, fire, or loss, on the condition of receiving a fixed sum or percentage on the amount of the risk, or certain annual payments—such percentage being termed the *premium* (see INSURANCE). POLICY-HOLDER, one to whom a policy of insurance has been granted.

POL'ICY: the name given a lottery or gambling system, formerly common in New York and large cities. A combination of numbers like 3–11–44 is selected by the player who marks his numbers or 'guesses' on a strip or ticket, for which he pays a small sum. The lottery drawing of three numbers awards prizes to those persons having guessed correctly. A favorite or common combination of numbers is called a 'gig.'

POLIGNAC, *po-lēn-yák' :* ancient French family, named from a castle said to have been built in the 5th c., on a rock of the Cevennes, near Puy-en-Velay, dept. of Haute-Loire, on the site of a Roman temple dedicated to Apollo, whence—according to certain rather credulous genealogists—the castle was originally called *Apollianique*, of which P. is affirmed to be only a later corruption.—The first of the Polignacs who acquired celebrity was Cardinal MELCHIOR DE P. (1661–1742), b. Puy-en-Velay, younger son of ARMAND, 16th Marquis DE P. He was educated at Paris for an ecclesiastical career, and in the negotiations of Cardinal de Bouillon with Pope Alexander VIII., 1689, the young, but astute and insinuating abbé took a principal part. In 1695; he was sent to Poland as French ambassador, when John Sobieski was dying; and diplomatized and intrigued so cunningly in favor of Prince de Conti, that the latter was actually elected his successor. Events, however, frustrated this policy, and P. lost the royal favor. In 1702—after a stroke of his usual neat flattery—he was recalled to Versailles, and rose higher into favor than ever; was named *Auditeur de Rote* 1706, and was sent to Rome. He was appointed French plenipotentiary at the Congress of Utrecht 1712; and when Louis XIV. died, was at the top of his reputation and influence. During the regency of the Duke of Orleans, he took part in the conspiracy of Cellamare, and was banished to his abbey of Anchin. 1725–32 P. had the conduct of French affairs in Rome. He was made Abp. of Auch 1726; and on his return to France, spent the remainder of his days in literary repose. He had written, about 1700, *Anti-Lucretius*, semi-metrical refutation in Latin of the skepticism of Bayle (pub. 1745). P. succeeded Bossuet at the Académie Française 1704. See C. Faucher's *Histoire du Cardinal de Polignac* (2 vols. Paris, 1772), St. Simon's *Mémoires*, and D'Argenson's *Mémoires*.

The other members of the P. family who have a historical name at all are notorious rather than noteworthy. In the reign of Louis XVI., TOLANDE-MARTINE, GABRIELLE DE POLASTRON, Duchesse DE P. (1749–1793), and her husband, JULES, Duc DE P. (1817), were among the worst, but unhappily most favored advisers of Marie Antoinette. They obtained vast sums of the public money from their royal master and mistress; and were largely, if not mainly responsible for the frightful pecuniary extravagance of the court. The discovery of the famous *Libre Rouge* occasioned the exulting cry of Mirabeau; *Mille Écus à la Famille d'Assas pour avoir sauvé l'État; un Million à la Famille Polignac pour l'avoir perdu!* The Polignacs—knowing the deep hatred felt toward them by the French people—were the first of the *noblesse* to emigrate (1789, July 16). From Empress Catharine of Russia, the duke received an estate in the Ukraine, and did not return to France at the Restoration.—He left three sons and a daughter, of whom only one has become historical—AUGUSTE JULES ARMAND MARIE, Prince DE P. (1780, May 14—1847, Mar. 29, b. Versailles). At the Restoration, he

returned to France; became intimate with the Comte d'Artois, afterward Charles X.; showed ardent attachment to the Church of Rome—at least to its policy—and received from the pope, 1820, the title Prince; was appointed ambassador at the English court 1823; and 1829 became head of the last Bourbon ministry, in which capacity he promulgated the fatal ordonnances that called France to arms, and drove Charles X. from the throne. He then attempted to flee from the country, but was captured at Granville Aug. 15; was tried, and condemned to imprisonment for life in the castle of Ham, but was set at liberty by the amnesty 1836, Nov. 29. He then made his residence in England, but died at Paris.

POLISH, a. *pō'lĭsh:* of or from Poland or its people.

POLISH, n. *pŏl'ĭsh* [F. *polir*, to smooth; *polisssant*, smoothing: L. *polio*, I smooth]: a smooth glassy surface produced by friction or rubbing; artificial gloss; elegance of manners; refinement; substance used to impart a gloss (see DIAMOND: GRINDING: EMERY: PASTES: PUTTY-POWDER): V. to make smooth and glossy by rubbing or friction; to become smooth or glossy: to make elegant or polite; to refine. POL ISHING, imp.: ADJ. making smooth or glossy: N. the act of making smooth or glossy; the refining of manners; smoothness; glossiness given by rubbing; a substance that polishes or is used in polishing. POLISHED, pp. *pŏl'ĭsht:* ADJ. smooth and glossy; refined; polite. POL'ISHER, n. *-ẽr*, one who or that which polishes. POLISHING-IRON, a smoothing-iron; a bookbinder's tool. POLISHING-PASTE, a kind of blacking for harness and leather; a varnish for imparting a gloss to furniture. POLISH-POWDER, a preparation for brightening articles of metal. TO POLISH OFF, to finish completely, in allusion to the finishing of an article of furniture for use; to do thoroughly and for good. POLISHING OF METALS, removal of any tarnish or oxidation by means of some material which will chemically act upon it; for this purpose, sulphuric, hydrochloric, oxalic, and acetic acids are used to different metals, and in various states of dilution. Usually, it is necessary to remove the acid with clean water, and dry rapidly, to prevent re-oxidation; and then either friction with various polishing materials, or rubbing with a smooth hard surface or burnisher, brings out the lustre of the metal. POLISHING OF STONE, see STONE-CUTTING. POLISHING-SLATE, mineral used for polishing glass, marble, and metals; composed chiefly of silica, with a little alumina, lime, oxide of iron, and water; white, yellowish-white, or yellow: and of specific gravity about half that of water. It is found in Bohemia, Saxony, and Auvergne, and is supposed to be a volcanic product.

POLISH LANGUAGE AND LITERATURE: widely-spread branch of the Slavic Language and Literature (q.v.); forming (according to Dobrowsky), with the Bohemian, the w. branch. The *Polish language* surpasses almost all other Slavonic tongues in euphony and flexibility, and is scarcely excelled by any language in brevity. It does not make use of the article, but has a most elaborate declensional system, comprising seven cases. The conjugation of the verb is equally elaborate, and enables a Pole to express transitions and delicate niceties in the conditions of time and gender quite unknown to the French, or German, or English verb. The Polish vocabulary also is uncommonly rich. The number of harsh consonants in the language, it must be admitted, is large, forming a marked distinction between it and its eastern sister, the Russian, but in pronunciation, these are so much softened that its euphony is preserved. It alone of all Slavic dialects, except the old Slavic church language, has two nasal sounds; one like the French *on*, the other like the French *in*. The letter *l* has a peculiarly broad snarling sound. After the introduction of Christianity, Latin, the language of the church, exercised a powerful influence on its structure and development, and subsequent to the 14th c., it adopted into its vocabulary numerous German words. In the 16th c., Polish, as a written language, rapidly attained such perfection that it supplanted even Latin itself, until then the language of the state and of the learned. The best Polish grammars are those of Mrongovius (3d ed., Danz. 1837), Bandtke (Breslau 1824), Muczkowski (Crac. 1845), and Booch-Arkossy (1866); the most comprehensive dictionary is that of Linde, after which rank those of Bandtke (2 vols. Breslau 1806), Mrongovius (Königsb. 1835), Trojanski (4 vols., Posen 1835–46), and Liebkind (1855).

The history of *Polish literature* is divisible into five clearly marked periods.—The *first* extends from a date antecedent to the introduction of Christianity to the close of the 15th c. Of pre-Christian Polish literature, nothing has survived but some popular songs and proverbs. Among the very oldest literary monuments is a hymn to the Virgin Mary, ascribed to St. Adalbert. The introduction of Christianity paved the way for a Latin literature more or less ecclesiastico-historical. Casimir III. (q.v.), surnamed the Great, did more than any other early Polish monarch for encouragement of literature, and, among other things, founded the Univ. of Cracow, which, from the beginning of the 15th c., long continued to be the centre of intellectual life and culture in Poland. To the 15th c. belong Jan Dluglosz (Lat. *Longinus*), author of an interesting and valuable *Historia Poloniæ*, in 13 books, and otherwise worthy of remembrance as an able diplomatist and philanthropist; also Jan Laski (1457–1531), Abp. of Gnesen, whose collection of the oldest Polish laws, *Commune Inclyti Poloniæ Regni Privilegium*, is of great historical importance. In 1490 the first printing-press in Poland was established at Cracow.

The *second* period of Polish literature comprises the 16th and first quarter of the 17th c., and is marked by the use

of the Polish as a written language. The reigns of Sigismund I. and Sigismund II. Augustus, are regarded as the golden era of Polish literature, properly so called. The series of poets begins with Nikol. Rej (1515–1568), commonly called the *Father of Polish Poetry*, a native of Zoravno, in 'Little Russia,' and educated at Lemberg and Cracow. He spent his life at the court of the Sigismunds. His principal works, *Wizerunek Zywota Czlowieka Poczciwego* (Crac. 1560) and *Apophthegmata* (Crac. 1568), are full of sharp wit and strong satire, and though the language is rough and unpolished, it is poetical. After Rej, the brothers Jan and Piotr Kochanowski hold highest rank. Szymonowicz, or Simonides (d. 1629), acquired by his Latin odes the name the 'Latin Pindar;' and his *Sielanki* ('Idylls,' new ed. Leip. 1837), modelled on those of Theocritus, exhibit a charming simplicity of style. Still more original, though scarcely so graceful, are the *Sielanki* (new ed., Leip. 1836) of his friend Zimorowicz (d. 1629). Sebastian Klonowicz, called *Acernus* (d. 1608), is notable as a satirist and descriptive poet. The Reformation, which rapidly made way in Poland, being tacitly approved by the rulers and magnates, gave powerful stimulus to the intellectual and spiritual activity of the nation—visible in translations of the Bible, hymn-books, and an important pulpit or sermon literature. Among historians of this period, most famous are the brothers Bielski; Lukas Górnicki (d. 1591), author of a history of the Polish crown (*Dzieje w Koronie Polskiéj*, Crac. 1637, Wars. 1804); Strzikowski (d. 1582), whose *Chronicle of Lithuania* (Königsb. 1582) is an admirable work; and Paprocki (d. 1614).

The *third* period of Polish literature, 1650–1750, is coincident with the rule of the Jesuits, who obtained a footing in Poland about 1566, through the influence of Cardinal Hosius, soon possessed themselves of the schools, and, on the whole, seriously checked the literary and religious growth of the nation. The most conspicuous poet of this retrogressive period is the Jesuit Kazimierz Sarbievski (1595–1640), who wrote only in Latin; others more or less noteworthy are Kochowski (d. about 1700); Tvardovski (d. about 1616); Opalinski (d. 1655); Chros'cinski, translator of Lucan; Morsztyn, translator of Corneille; and Elz'sbieta Druz'backa (d. 1760). Among historians of this period, are Starovolski (d. 1656), author of *Polonia, sive Status Regni Poloniæ Descriptio* (Wölfenbuttel 1656), and other works; Kojalowicz, Jesuit (d. 1677), and Kaspar Niesiecki, Jesuit (d. 1745), whose *Korona Polska* (4 vols. Lemb. 1728–43) is the most important work on Polish heraldry.

The *fourth* period, commencing with the middle of the 18th c., and extending into the first quarter of the 19th, owes its characteristics partly to the influence of the French literature of Louis XIV.'s time; partly to the liberal patronage of literature and science by King Stanislas Augustus, the princes Czartoryski, Jablonovski, and other magnates, and the educational reforms of Stanislas Konarski (1700–73). The good work begun by Konarski was carried on by Kopczyn'ski (1735–1817), who was the first to establish on

a scientific basis the grammar of the Polish language in his *Grammatyka Norodova;* by Piramowicz (d. 1801); by Bohomolec, Jesuit, who translated a multitude of stage-pieces from the French ; but above all, by Adam Stanislas Naruszewicz, accomplished translator of Tacitus; and Ignacy Krasicki (1735–1801), called the 'Polish Voltaire,' the centre of the whole Polish literature of his age, whose satires and fables are reckoned the first in his native language. As poets of this Renaissance period, occur the names of Trembecki, Cajetan Wegierski, Godebski, and Wezik. The most noted dramatist is Boguslavski (d. 1829), who wrote about 80 plays—the majority of which, under the title *Dziela Dramatzezne*, were published at Warsaw (9 vols. 1820).

The political storms that swept over Europe at the close of the 18th and the first years of the 19th c., did not quite destroy the new literary life that had burst into blossom under Stanislas Augustus. In 1801 the historian Tadeusz Czacki, Franciszek Dmochowski, and Bp. Jan Albertrandy founded at Warsaw the 'Soc. of the Friends of Knowledge,' which, especially under the auspices of the state-councilor Staszyc, bore good fruit till it was dissolved 1832, when its library of 50,000 vols. was carried off to St. Petersburg. At the same time, Jozef Maximilian Ossolinski, Hugo Kolontaj, and Stanislas Potocki, by word and writing exercised a mighty influence on the renovation of the national spirit.—The transition to this *newest* or *fifth* period was made by Karpinski (1745–1825), whose Songs and Idylls (4 vols., Warsaw 1804; new ed., Leip. 1836) live on the lips of the Polish people; by Chancellor Voronicz (1757–1829), richly imaginative poet and great orator; by Niemcewicz (1757–1841), statesman, soldier, and author of celebrity in his own land ; and by the poet Kasimierz Brodzinski (1791–1835). At Wilna, which, after 1815, became the centre of Polish literary activity, and a rallying-point for all the enthusiastic spirits of the land, several young men united, with Adam Mickiewicz (b. 1798) at their head, in a crusade against the still dominant French style of literature. Some of his numerous and brilliant associates were Malczevski (1792–1826), whose best production is his epic-lyric narrative of Ukraine life, entitled *Marja;* Goszczynski (b. 1806; Poems, 3d ed., Breslau 1852); Bohdan Zaleski (b. 1802; *Poezye*, Pos. 1841, and later); Tomasz Padura (*Pienia*, Lemb. 1842); Odyniec (*Poezye*, Pos. 1833); Korsak (*Poezye*, Pos. 1833); Chodzko (*Poezye*, Petersb. 1829); Groza (*Poezye*, Wilna 1836); Lucyan Siemienski (b. 1809), excellent novelist and translator; Bielovski (b. 1806), lyric poet and translator; Gorecki, renowned for pungently sarcastic fables (*Bajki i Poezje nove*, appeared at Paris 1833); Garczynski (*Poezye*, Paris 1833); and Slowacki, most fertile of recent Polish poets. Most of these writers became either 'banished men,' or men who, while living, were forced to expatriate themselves. They belonged to the 'Polish Emigration,' whose head-quarters was Paris. The most many-sided and prolific of modern Polish novelists is Jozef Ignacy Kraszevski. b.

Warsaw 1812. The new national tendency of Polish literature, which naturally first showed itself first in poetry, soon became visible in other departments also. Thus, Joachim Lelewel (b. 1786) rose to the first rank as a writer of Polish history, and a study of his works is absolutely indispensable to a knowledge of that subject; next to him (and later) in the same department stand Bandtke, Maciejovski, Count Raczynski, and Count Plater. Narbutt of Wilna wrote a very solid and comprehensive work on Lithuanian History (Wilna 1837 *et seq.*), and Lukaszewicz of Posen has furnished numerous important contributions to the history of the Reformation in Poland. A multitude of works more or less weighty have been devoted to a record of the revolution of 1830, chiefly byPolish emigrants. Into the departments of philosophy, theology, and physical science, Polish literature has entered but little.—The principal works on Polish literature are those of Muczkovski, Bentkovski, Ossolinski, Chodynicki, Lukaszewicz (Posen 1860), and the comprehensive history by Visznievski. See also the history of Polish literature in German by Nitschmann (1882); Morfill's *Russia* (1880), and the same author's excellent *Slavonic Literature* (1883).

POLISTENA, *pō-lĭs-tē'nâ:* town of s. Italy, province of Reggio, Calabria. The village which occupied the site of the present town was totally destroyed by earthquake 1783. Pop. 7.000.

POLITE, a. *pō-līt'* [L. *polītus*, polished, refined—from *polĭo*, I smooth: It. *polito*]: refined or well-bred in manners; polished; courteous; obliging. POLITE'LY, ad. *-lĭ.* POLITE'NESS, n. *-nĕs.* good-breeding; refinement in manners; courtesy; obliging attentions. POLITE LITERATURE, those branches of knowledge or instruction, apart from art and science, which please the understanding and refine the taste. —SYN. of 'polite': polished; refined; genteel; elegant; courteous; well-bred; affable; obliging; civil; courtly; urbane.

POLITESSE, n. *pŏl'ĭ-tĕs'* [F. *politesse*—from It. *politez'za*, politeness, elegance]: over-acted politeness, used in contempt.

POLI'TIANUS (or POLI'TIAN), ANGELUS: see POLIZIANO, ANGELO.

POLITIC, a. *pŏl'ĭ-tĭk* [F. *politique*, political—from L. *poli'tĭcŭs;* Gr. *politikos*, of or belonging to civil polity or to the state—from *polis*, a city: It. *politico*, cunning, political]: wise, prudent, and discreet in the management of public affairs; well-devised, and adapted to promote the welfare of the state; judicious; artful; cunning; crafty. POLITICS, n. plu. *pŏl'ĭ-tĭks*, art or science of conducting the affairs of a kingdom (see below): system of management of public affairs adopted by a party: in a narrower sense, the contest of parties in a state for power in the management of its affairs. POLITICAL, a. *pō-lĭt'ĭ-kăl*, pertaining to the civil government of a state and its administration—derived from an office under government, or from some connection with it; treating of politics or government. POLIT'ICALLY,

ad. *-lĭ*, in relation to the public administration; in a political manner. POLITICIAN, n. *pŏl'ĭ-tĭsh'ăn*, a man skilled in politics, or who devotes himself to them. POL'ITICLY, ad. *-tĭk-lĭ*, in a politic manner; artfully; cunningly. POLITY, n. *pŏl'ĭ-tĭ* [Gr. politeia, system of government]: the form or constitution of the civil government of a country; the general principles that regulate the conducting of public affairs.—SYN. of 'politic': prudent; wise, artful; cunning; discreet; sagacious; provident; wary.

POLITICAL ECONOMY. The word economy from the Greek for house-law or house-regulation, refers to the material portion of domestic regulation. The most important part of it, in this use, is the adjustment of the expenditure to the income of the household. The term 'Political' came to be used with it as a convenient method of expressing the application to a state of sound system of management in relation of its affairs. In later times, however, the word, as applied to a community, has taken larger and deeper application. Political Economy now means the science of those laws of physical nature and of human nature that govern the social or coöperative life of man, and which relate especially to the production and the distribution of Wealth. Its significance is more like that of communal economy, or commercial and industrial economy, than of governmental economy. The income and expenditure of the government, as distinguished from that of the people of the community, are considered, however, as forming a department in political economy, called Finance (q.v.). It is evident that on a field so vast and so diversified with complex interests, there is likelihood of the formation of parties of theorizers on various separate lines. This has been the fact. The divisions mostly have been casual rather than scientifically developed; though there is a claim to a scientific development of political economy prominently made by advocates on both sides of the question whether government shall positively regulate the proceedings of the people in all or any of their leading economic interests, or instead shall trust to the unobstructed action and reaction of the great natural laws (supply and demand, etc.) to bring to bear through individual initiative all needful regulation. Thus, for illustration, if any were to advocate the utmost extreme of Free Trade (see FREE TRADE), such advocates might give political economy what they would deem a scientific development in the direction of trusting to general natural laws; while at the other extreme Protectionists (see PROTECTION), *Socialists* (see SOCIALISM), and Communists (see COMMUNISM), tend to give political economy what they deem a scientific development in the direction of putting no faith in great natural laws, but ordering all by governmental control. It is not the province of this work to decide between

these. Political economy may be regarded as having had four periods of development. The first is the Primitive, which, like all the primitive periods of communal development, is only more or less historical; the second is the period of the Mercantile System, which the Physiocrats attacked, and which Adam Smith controverted in his *Wealth of Nations;* the third is the period of the Classical School, which Adam Smith and his disciples established; and the fourth is the present transition period, in which variations of Classical doctrines are in conflict with Scientific hypotheses. For further discussion of various departments or relations of Political Economy see ANARCHISM; BOUNTY; BANK-BANKING; CAPITAL; COINAGE; COLONY; COMMUNISM; COMPETITION; CONSUMPTION (in Political Economy); COÖPERATION; CREDIT; CURRENCY; DEBT; DEMAND AND SUPPLY; EXCHANGE; EXCISE; FINANCE; FOURIERISM; FREE TRADE; INTEREST; INDUSTRIAL UNIONISM; LABOR; MACHINERY, POLITICAL ECONOMY OF; MONEY; MONOPOLY; PAUPERISM; PROFIT SHARING; PUBLIC CHARITIES; RENT; REVENUE, PUBLIC; SLAVERY; SOCIALISM; SOCIAL SERVICE; SOCIOLOGY; TAXATION; TAX, SINGLE; TARIFF; TEMPERANCE; TRADE UNION; TRUSTS; VALUE; WAGES; WEALTH.

POLITICAL OFFENSES: crimes considered injurious to the safety of the state, or involving violation of the allegiance due by a citizen or a subject to the supreme authority of the state.

By the Roman law, in the early times of the republic, every act injurious to the state was comprehended under the name *perduellio,* and visited with death. That term included conspiracy against the government, aiming at kingly power, aiding the enemies of Rome, and losing an army. The word *perduellio* afterward fell into gradual disuse, and the chief state offenses were known by the term *majestas,* or *crimen læsæ majestatis,* somewhat akin to the treason of modern times. In the republican period, the crimes to which the epithet *læsa majestas* was most frequently applied, were the betrayal or surrender of an army to the enemy, the excitement of sedition, and such a course of administration as impaired the dignity of the state. In imperial times, acts and words disrespectful to the reigning emperor were included, and an indignity to his statue was visited almost as severely as an offense against his person. *Læsa majestas* was generally punished with death, confiscation, and infamy. The criminal might even be tried after his death, to the effect of confiscating his property, and rendering his memory infamous—a practice to which resort was had in France and Scotland as late as the beginning of the 16th century.

In modern times, the acts brought under the category of political offenses have varied at different periods and

in different countries. They have in general been dealt with more leniently under constitutional than under despotic governments. It is, however, a principle which has been generally recognized by the most constitutional of governments, that when the legislature thinks itself endangered by a secret conspiracy against the state, or an understanding with the enemies of the country, it permits the executive, for a limited time, to arrest suspected citizens, without the formalities required in ordinary circumstances.

In England, a large number of the graver political offenses are included under the denomination Treason; and the treason law has sometimes been stretched to include offenses which by a fair construction could hardly come within it, such as the use of violence to reform religion or the laws, or to remove the councilors of the sovereign. Even riotous assemblies with the object of destroying all property of a particular class have been held treason. Political offenses include also a number of crimes against govt. falling short of treason, and passing under the name Sedition, which, though they have for their ultimate object the violation of the public peace, do not aim at direct and open violence against the laws or the sovereign, but rather the dissemination of a turbulent spirit tending to produce such violence. The British government does not permit the political offenders of other countries to be included in extraditional treaties: and in modern times, generally speaking, extradition does not apply to political offenders; contrary to the doctrine laid down by Grotius. In some countries, conspiracy against the sovereign of any country in league with the state is a special offense; in Great Britain, however, this seems not to be the case.

In the United States the only political offense recognized by the federal constitution is treason, which (art. III. sec. 3) is defined to 'consist only in levying war against' the United States, 'or in adhering to their enemies, giving them aid and comfort.' Hence it is not treason to assassinate the president, while in a monarchial govt. the slaying of the head of the state, or even the attempt to slay, is always *Crimen læsæ majestatis*. The United States have never extradited persons charged with political offenses against foreign govts., who may have taken refuge in this country. But if the act of treason were the assassination of a sovereign, the assassin would doubtless be extraditable if an extradition treaty covering the case of wilful murder existed between the two governments.

POLITICAL PARTIES. Political parties in the United States are voluntary associations, usually of men but sometimes including women, created and maintained for the purpose of propagating certain political ideas and principles and for producing legislation and public administration in accordance with these ideas and prin-

ciples. Since men under a free government will certainly disagree earnestly and honestly about the application of these principles in the methods of government, political parties are inevitable. 'You say our divisions,' said John Adams, 'began with Federalist and Anti-Federalist. Alas! they began with human nature.' The Tories and Patriots of the Revolutionary era, so far as its troubled years permitted, were just as much political parties as were those groups of men who later divided on the interpretation of the Constitution or on the doctrine of protection.

From the Declaration of Independence in 1776 to the inauguration of Washington in 1789, political opinion was slowly crystallizing, and men were permanently dividing upon two fundamental principles, which have been the determining factors in the alignment of the two great political parties which have since struggled for supremacy, by one name and another, in State and National governments. In the Constitutional Convention of 1787, and during the years immediately following it, those advocating a strong central government, interpreting liberally the powers conferred on it, were known by the name Federalist, while the different groups of men who opposed, for various reasons, the consolidated federal republic decided upon by the Convention, were called anti-Federalists. The former were positive, aggressive, and coherent, and as the 'friends of the Constitution' they started the new government on a powerful national basis; the latter were but loosely held together by the fact of their opposition to Federalist principles and measures.

Though Washington as President was no mere figurehead, he was neither a creative statesman nor a great party leader. The work of organizing and using the Federalist party, therefore, fell to Alexander Hamilton, John Adams, John Jay, and Jonathan Trumbull (q.v.). Under their management, the machinery of a strong Federal government was made and put into operation; from the general phrases of the Constitution, they wrought out the doctrine of implied powers, and applied it in the establishment of the Bank of the United States. By their measures for import duties, direct taxes, and excises or internal revenue, they gave the Federal government an adequate and independent revenue. They frankly favored Great Britain, the bitter enemy of their country during the Revolution, rather than France, to whom the United States was bound by a solemn treaty of alliance and commerce, and in the climax of the French Revolution, when war broke out between Great Britain and France, in 1793, the Federalist administration proclaimed the neutrality of the United States instead of taking the part of France.

The anti-Federalists opposed almost every principle and act involved in the proceedings just enumerated

and in many others. They stood for a strict interpretation—'strict construction'—of the phrases and clauses of the Constitution, for a Federal government of very distinctly limited scope and power, for reliance on the good sense of the people as a whole rather than upon the wisdom of a handful of leaders, and for an active support of the French Revolutionary government which seemed to be trying to apply the very principles for which the Americans had fought a seven-years war for independence from monarchy and oppression. Under the uniquely skilful leadership of Thomas Jefferson the league of factions opposing the Constitution and the Federalist measures up to 1791, was welded into an aggressive and resourceful party, which was variously called Democratic, Democratic-Republican, and, when the orgies of the 'Democrats' in France brought that name into bad odor, simply Republican. By this last name it was known for about 30 years, when it again took the name Democratic, by which it has ever since been called. Besides Jefferson, the prominent leaders of this early Republican party were George Clinton, Edmund Randolph, Aaron Burr, and James Madison (qq.v.).

The first election in which the two parties made open contest for the Presidency resulted in 1796 in the election of the Federalist John Adams. During his term, the Federalists steadily lost prestige, in spite of their great constructive work; their party was split into factions; their odious Alien and Sedition Acts strongly suggested monarchy and arbitrary power; and their enemies were united, vociferous, and managed with a skill that bordered on the unscrupulous. The election of 1800 was won by the Republicans, Jefferson being chosen President by the House of Representatives, after the electors chosen by the states failed to make choice. The Federalists never regained control of the administration, and by 1816 their party was practically extinct.

From 1789 to 1815 a very great influence was exercised upon political parties by problems arising out of foreign relations of the United States. At almost every turn, in this period, there fell across the pathway of political leaders in both parties, the shadow of George III. or his ministers on the one side, or of Napoleon or some French minister on the other side. In their endeavors to inflict injury on each other, both the French and the English were alike disregardful of the rights and property of American citizens and of the honor of the United States, capturing ships, confiscating cargoes, impressing American seamen within sight of American ports, and issuing Orders in Council and Decrees in the most arbitrary manner.

After 10 years of refusal to carry out the plain provisions of the Treaty of 1783, Great Britain grudgingly

made a treaty with the United States. Washington accepted this treaty, known as Jay's treaty, not as satisfactory, but as the best obtainable, since it settled some of the disputes pending between the two countries. Nevertheless it was declared by the Republicans to show Federalist subserviency to Great Britain, and it gave grave offense to France (see UNITED STATES—*History*). The insolence of France at length became intolerable and aroused a war-spirit in the United States. This condition of affairs brought a strong reaction of public favor to the Federalists, and they probably might have retained control of the government had they not been fatally misled in 1798 into passing the Alien Acts and the Sedition Act (see ALIEN AND SEDITION LAWS), which strained the Federal power beyond all limits, and gave the Republicans good ground for their charge that these Federalist laws infringed that personal liberty guaranteed by the Constitution. Thus the Federalists forfeited their last hold upon popular favor at the same time that the quarrel between President Adams and Hamilton became irreconcilable.

Against the Alien and Sedition Acts the legislatures of two Republican states made vigorous formal protests, in the Kentucky Resolutions, drafted by Jefferson, and in the Virginia Resolutions, drafted by Madison. These resolutions have been termed the 'first authorized proclamation of the strict construction party,' and were part of the campaign material contributing to the Republican victory in the 'Revolution of 1800'; they were also the first of a series of pronouncements, usually by minority parties, whose essential meaning was nullification of Federal law, and whose logic led to secession from the Union.

The Federalists, out of power, loudly advocated some of the early principles of their political enemies, opposing the admission of new States from the Louisiana Purchase without the consent of the old States, declining, during the War of 1812, to put the militia of Federalist States like Connecticut under Federal control, and vaguely threatening secession in the Hartford Convention in 1814. On the other hand, the Republicans, in power, adopted, in practice, several of the important principles and measures for which they had previously criticised the Federalists,—a loose construction of the Constitution, as evidenced in the Louisiana Purchase (q.v.), and the Embargo Acts; a direct tax for the support of the War of 1812; and large increases of the army and navy. It was this broader, more practical Republican party which carried on the government, first under the old leaders, Jefferson, Madison, Gallatin, Randolph, and Monroe, and then under the younger leaders, Calhoun, Porter, Crawford, Clay, and John Quincy Adams (qq.v.), until the old questions were settled or outgrown, and a

new set of questions caused a new arrangement of party lines.

The buoyant period of western expansion, of agricultural and industrial development, of emancipation from the fear of foreign interference, coinciding roughly with Monroe's administrations from 1817 to 1825, is sometimes called the 'Era of Good Feeling,' but so far as party history is concerned, it was a time of personal intrigue, maligning, and ill feeling among the leading men, seldom equalled in the nation's history. While Monroe was re-elected in 1821 by an electoral vote lacking just one of being unanimous, the campaign of 1824 found Clay, John Quincy Adams, Andrew Jackson, Crawford, Calhoun, and DeWitt Clinton (qq.v.) eager competitors for votes. No one had a sufficient number of electoral votes to elect, so the election was carried to the House of Representatives again, and Adams was chosen, to the anger and disgust of the 'Jackson men,' who at once began the campaign of 1828. They soon took the name of Democrat, in distinction from the broad construction, Adams-Clay wing of the party, which began to call itself the National Republican party, and which advocated a protective tariff, public improvements at national expense, and staunch support of the Bank of the United States. As the cleavage between the two divisions of the old Republican party became complete, the National Republicans took the name Whigs, by which they were known for the twenty years following 1834.

The campaign of 1828 between President Adams, a New Englander of fine training, wide experience, and broad national sympathies, but cold and uncompromising as a leader, and Andrew Jackson (q.v.), the military hero of New Orleans and of the Florida Indian wars, the embodiment of the confident, impatient West, but a man with no large civil experience, was fought with a bitterness and intemperance quite unparallelled in earlier campaigns. Jackson won, with 178 electoral votes to Adams's 83, and a popular vote of 647,276 to 508,064. The traditions of Cabinet succession to the Presidency and of government by trained masters in statecraft were overthrown; 'the new West and the frontier had taken the whip hand in political management.'

The twelve years of the Jacksonian era include two terms under Jackson himself and one under his protégé and second Vice-President, Martin Van Buren (q.v.). It was a period when new tendencies, policies and principles took shape, affecting the country for more than a half century; a liberal policy in dealing with western lands helped to extinguish the national debt and to stimulate internal improvements and immigration; the tariff became a permanent partisan issue; nullification reached another acute stage, under the leadership of Calhoun, in the years from 1828 to 1832; a fierce and successful war was made upon the

Bank of the United States whose cause was championed by Clay, and the recognized head of the National Republican (later Whig) party, after the defeat of Adams in 1828, and its candidate for the Presidency in 1832 and 1844. Two new parties gained some headway in this period: the anti-Masonic party, organized after the mysterious disappearance of William Morgan in western New York in 1826, which secured the seven votes of Vermont for its candidate for President in 1832 and elected a governor of New York in 1835. It was finally absorbed by the Whig party. The Liberty party, the first political organization of the pronounced abolitionists, took form about 1839, cast 62,300 votes for John G. Birney (q.v.) in 1844, and then merged with the Free Soil party.

Jackson was responsible for making the civil service of the United States a part of the machinery of the political party in power at Washington,—a means of rewarding his friends and punishing his enemies. Six Presidents in 40 years before 1829 made 74 removals; Jackson, in nine months, made more than 150, and his successors in the office were not slow to follow his example; when a change of the party in power took place, until the inauguration of the merit system in 1883, a clean sweep of the chief officeholders was likely to take place, to make room for the friends and party workers of the successful candidate.

Another significant change in political machinery falls into the Jacksonian era,—the development and complete nationalization of the system of delegate conventions for nominating party candidates. Such conventions were used earlier in New York and Pennsylvania, but it was not until 1830 that the first national convention, that of the Anti-Masons, representing ten states, met in Philadelphia. In the next two years, the two great parties adopted the convention method for making Presidential nominations. The National Assembly of Young Men (National Republicans), in the convention at Washington, May, 1832, adopted ten resolutions, the first platform ever adopted by a national convention. In the same month, the National Democratic convention met in Baltimore, and adopted the two-thirds rule which has since bound Democratic national conventions. Thus the different parts of the party machinery in use since were in working order by 1840—local and legislative nominations or endorsements, formal and final nominations by national conventions, the adoption of a party platform, the organized campaigning.

The following table of the electoral and popular votes for President in the five elections beginning with 1836, will show the ebb and flow of party sentiment, and the influence of personalities on the popular imagination. With the exception of the changed conditions of slavery and the changed attitude of slaveholders and the acquisi-

tion and control of new territory in the interests of slavery, no important new issue arose in this period.

	Electoral.	Popular.
1836—Van Buren, Dem.	170	762,678
Harrison (q. v.), Whig	73	
White	26	736,656
Webster, (q. v.)	14	
Mangum	11	
1840—Harrison, Whig	234	1,275,017
Van Buren, Dem.	60	1,128,702
Birney, Liberty		7,059
1844—Polk (q. v.), Dem.	170	1,337,243
Clay, Whig	105	1,299,068
Birney, Lib.		62,300
1848—Taylor (q. v.), Whig	163	1,360,101
Cass, Dem.	127	1,220,263
Van Buren, Free Soil		291,263
1852—Pierce (q. v.), Dem.	254	1,601,474
Scott (q. v.), Whig	42	1,386,578
Hale, Free Dem.		156,149

Just as foreign relations had been an irritant in all calculations of political parties in the first quarter century of the Republic, so the extension of slavery to the Territories beyond the Mississippi, and to those areas which were acquired at the behests of the slave power, was an omnipresent and increasingly disturbing factor in party councils from 1842 to the Civil War. The struggle over the Missouri Compromise (q.v.) in 1820 foreshadowed a sectional division of parties on the slavery question,—a northern party against the expansion of slavery if not against the institution itself, and a southern pro-slavery party,—but the Compromise postponed for a generation the acute and decisive discussion of the vital issue of freedom, until the northern party was strong enough to determine the restriction, and ultimately the abolition, of negro slavery.

The radical abolition movement attracted little attention in the two political parties before 1845, though the Democratic platform of 1840 denounced the efforts of the Abolitionists. But when the Democratic party in 1844 reiterated its pro-slavery resolution of 1840, committed itself to the 're-annexation of Texas at the earliest possible period,' and nominated a Southern slaveholder for President, the history of political parties enters on a new stage. The triumph of Polk and the immediate annexation of Texas ordained a war of conquest in the interest of the 'peculiar institution' of the South; the conscience of the nation was quickened, and the morality of slavery became a political issue, practically the first primarily moral issue that had arisen. It was precisely because of the injection of this moral element into the political questions of the next fifteen years, that compromises on the organization of new territory, on the expansion of slavery, and on fugitive slaves, could not settle permanently the tremendous is-

sue. After the election of Polk, the Democratic party frankly adopted a pro-slavery position, thus attracting large numbers of pro-slavery Whigs. The Whig party held to a compromise policy, distinctly refused to take an anti-slavery position, and thereby failed to receive any compensating gains for the loss of its pro-slavery contingent to the Democrats. Though it elected General Taylor in 1848, it steadily lost ground, and after its disastrous defeat in the Presidential campaign of 1852, it became extinct and its place was taken by a new party which had convictions, enthusiasm, youth, and leadership.

The elements out of which the new party was formed were some ten years in coalescing, the two most important being the 'Free Soilers' and the American, or 'Know Nothing' party. The former, or Free Soil Democrats, which absorbed the small Liberty party, already mentioned, originated in 1848 in a split in the Democratic party in New York, which sent to the national Democratic convention two contesting delegations. The radical faction withdrew from the Democratic convention upon finding that body adverse to slave restriction, and formed a part of a national convention at Buffalo in August, 1848, organizing the Free Soil party. This new party declared against the admission of slavery into new States or Territories, and nominated Martin Van Buren of New York for the Presidency, and Charles Francis Adams (q.v.) of Massachusetts for the Vice-Presidency, but it secured no electoral votes. It made nominations in 1852, repudiating the Compromise Measure of 1850 (q.v.) and the Fugitive Slave law (q.v.), but failed to obtain electoral votes. By 1856 it was fused with other elements forming the new Republican party.

The American party, derisively called 'Know Nothings' (q.v.) arose about 1852, and nationalized certain local 'Native American' parties of the '30's. It was based on opposition to the political influence of immigrants and all foreigners, and especially to the supposed interference of the Roman Catholic church in politics, and demanded for naturalization a residence of twenty-one years. In 1855 it carried local elections in five states, and in the year following it secured eight electoral votes for its Presidential candidate, Millard Fillmore (q.v.) of New York, and a popular vote of 874,-534 (more than one-fourth of the total cast). By the next Presidential election, the principle of 'Americanism' was overwhelmed by the slavery issue; and there was no revival of it until after 1876, and then unsuccessfully.

The new Republican party made its appearance in the Congressional elections of 1854, elected N. P. Banks, speaker of the House of Representatives in the Congressional session of 1855-6, superseded the Whigs in the

campaign of 1856, giving John C. Fremont a popular vote of 1,341,264 and an electoral vote of 114, against 1,838,169 popular votes and 174 electoral votes for James Buchanan, the Democratic candidate, and in 1860 elected Abraham Lincoln. This rapid recruiting and organizing of a successful political party was in response to a logical demand for a broad constructionist party, with profound courage and convictions, rather than a habit of compromising, in dealing with the great and overshadowing question of slavery. The disintegration of the old parties became noticeable as early as 1844, as already noted. The arrogance of slave interests dominated the Democratic party whose principle of strict construction of the Constitution was peculiarly available to prevent interference with the extension of slavery, and time after time victories were won at the expense of the northern anti-slavery sentiment through the ineffectiveness of the decrepit Whig party. The Compromises of 1850, the Fugitive Slave law, the repeal of the Missouri Compromise, the Kansas-Nebraska Act, the struggle for Kansas, and the Dred Scott decision (q.v.), were so many shocks quickening the northern conscience and forwarding the formation and triumph of the Republican party, which avowed its determination to respect the full constitutional rights of slavery where it existed in the States, but which at the same time declared that it would use without scruple the full power of the nation to prevent the extension of slavery to the new territories which were national property. Not abolition, but the nation's peace, security, and prosperity were the objects aimed at. Its first two platforms, while mainly concerned with various aspects of the slavery issue, declared for internal improvements at Federal expense or through Federal aid, particularly a Pacific railroad and work upon rivers and harbors; for the principle of the protective tariff; and for a homestead law for disposition of public lands.

The momentous and memorable campaign of 1860, the preface to secession and the Civil War, was contested by four groups of candidates representing three parties. The Democratic convention met in Charleston, S. C., in April. The platform adopted committed the party to Douglas's scheme of 'Popular sovereignty,' which would allow the people of a territory to decide for or against the exclusion of slavery, upon admission to the Union, and pledged the party to abide by the decision of the Supreme Court on questions of constitutional law; whereupon the convention split and the southern delegates withdrew. The regular convention, after adopting one platform, adjourned to meet in Baltimore six weeks later. There it suffered further secession, but finally nominated Stephen A. Douglas (q.v.) of Illinois, for President. The seceders from the Charleston convention later united with seceders from the Baltimore con-

vention in the nomination of John C. Breckenridge of Kentucky, on a platform of the most pronounced pro-slavery order. The Constitutional Union party, made up in part of former 'Know Nothings,' ignored the blaze of the slavery issue, and declared in general terms for the Constitution, the union of the States, and the enforcement of the laws—a call to peace, when war was in men's hearts. Its candidates were John Bell (q.v.) of Tennessee and Edward Everett of Massachusetts. The Republican party held its convention in Chicago and nominated Abraham Lincoln (q.v.) of Illinois for President, and Hannibal Hamlin of Maine for Vice-President, upon a vigorous platform denouncing the Democrats for their 'measureless subserviency' to the slave interests and for their threats of disunion, declaring it the duty of Congress to prevent the introduction of slavery into the territories. The votes in the election, resulting in the choice of Lincoln, were as follows:

		Electoral.	Popular.
1860—	Lincoln, Rep.	180	1,866,352
	Breckenridge, Dem.	72	845,763
	Bell, Const. Union	39	589,581
	Douglas, Dem.	12	1,375,157

The parties were at last sectionalized on the slavery issue; every free State except New Jersey cast its electoral vote solidly for the Republican ticket; Bell carried Virginia, Kentucky, and Tennessee, while Breckenridge received all the other southern votes except those of Missouri. Immediately after Lincoln's election in November, South Carolina seceded, and before his inauguration, seven States followed her example, and the Confederate States of America, fully recognizing slavery, were formed with Jefferson Davis (q.v.) of Mississippi as President, and Alexander H. Stephens (q.v.) of Georgia as Vice-President. Old party contests ceased and real war began when the Confederate States opened fire upon Fort Sumter in April, 1861.

In the campaign of 1864, the radical Republicans made the first move, holding a mass convention in Cleveland, adopting a platform calling for the preservation of the Union, the uncompromising suppression of the Rebellion, Congressional Reconstruction, the confiscation of rebel lands for distribution among the soldiers, and amendments to the Constitution providing for election of President and Vice-President by popular vote for one term only. John C. Fremont was nominated for President, and accepted, but later withdrew. Lincoln was renominated by the regular Republicans, upon a platform pledging a vigorous prosecution of the war to the unconditional surrender of the rebels, and the eradication of slavery from the United States by constitutional amendment. Andrew Johnson of Tennessee, a Border State Unionist, was nominated for Vice-President. The Democratic party nominated

Major General George B. McClellan (q.v.) of New Jersey, for President, and George H. Pendleton of Ohio, for Vice-President. The platform pronounced the war a failure, denounced the administration for its shameful policies, and called for immediate cessation of hostilities with a view to peace and the restoration of the Federal union of the States; but the nominee for President promptly repudiated these extreme statements, which grew more and more unpopular as the very spirited canvass progressed. The votes by which Lincoln was re-elected were Lincoln, 212 electoral, and 2,213,665 popular; McClellan, 21 electoral, and 1,802,237 popular.

The month following Lincoln's second inaugural, was marked by the surrender of the rebel armies, the assassination of the President, and the succession of Johnson to the Presidency. A number of vastly important questions relating to the reconstruction of the defeated States and the status of the emancipated negroes, soon took shape, and upon all of these partizanship ran high, and a serious split occurred in the Republican party. Before the struggle over the methods of restoring the seceded States to their full powers in the Union, and over the proper measures for protecting the emancipated slaves in their newly acquired rights was ended, Congress was passing measure after measure over the veto of the President, was restricting his powers, and finally was led to impeach and try him for 'high crimes and misdemeanors in office.' In the trial of the President by the Senate, he escaped conviction by one vote.

The eight years from 1868 to 1876 produced no large new issues in politics, save that of general reform in the civil service and administration. The stern policy of reorganizing the Southern States was clumsily pursued; the outrageous resistance of the Southern whites to the highly offensive negro and 'carpet-bag' rule imposed by the Republicans, met with unwise repressive measures. Meanwhile corruption in the Government was increasing, and a movement for reform was taking shape. General U. S. Grant (q.v.) defeated Horatio Seymour for the Presidency in 1868 and Horace Greeley (q.v.) in 1872, by the following votes:

	Electoral.	Popular.
1868—Grant, Rep.	214	3,015,071
Seymour, Dem.	80	2,709,613
1870—Grant, Rep.	286	3,597,070
Greeley, Dem., Lib., Rep.	(Died before vote)	2,834,079
Charles O'Conor		29,408
Black, Temperance		5,608

The nomination of Greeley by the Democrats, and his campaign which followed, form a unique episode in the history of political parties. He was the editor of the great Republican daily paper, the *New York Tribune*, and a pronounced protectionist, yet he was first nominated by the mass convention of the Liberal Repub-

licans along with B. G. Brown of Missouri at Cincinnati, on a platform scoring the Grant administration, especially in dealing with the South, and remitting the decision of the tariff question to the people for their action through the Congressional elections. He was later nominated almost unanimously by the regular Democratic convention, which adopted bodily the Liberal Republican platform. A small group of more orthodox Democrats made a separate nomination of Charles O'Conor of New York, who received a few thousand votes in spite of his declination of the nomination.

As the Presidential contest of 1876 drew near, the condition of the Republican party became steadily worse. In the South, where its dependence was upon the negro vote, it was losing its hold because the negro, with all the assistance provided by the national administration, including Federal troops at the polls, was unable to exercise his right as a voter. The Democrats, though still suffering in the North from the odium of their former pro-slavery attitude and their opposition to the war and thorough-going Congressional Reconstruction, were recovering power in the South, and gaining in strength and solidity in the North and West by their demands for reform in State and Federal government.

The chief candidates in 1876 were, of the Republicans, Gen. R. B. Hayes (q.v.), the mediocre and somewhat obscure governor of Ohio for President, and W. A. Wheeler of New York, for Vice-President; of the Democrats, S. J. Tilden (q.v.), the successful prosecutor of the corrupt Tweed 'ring' of New York City, and reform governor of New York State, for President, and T. A. Hendricks (q.v.) of Indiana, for Vice-President. Since the Democrats had already gained a majority in the House of Representatives, they compelled the Republicans to conduct a defensive campaign. The result of the voting was uncertain because of alleged frauds and irregularities in returns which affected 13 electoral votes, all but one of which were in the Southern States. The undisputed electoral vote, and the recorded popular vote were, for Tilden, 184 and 4,284,885, and for Hayes, 185 and 4,033,950, while Peter Cooper (q.v.) the Independent candidate received 81,740 popular votes, and the prohibitionist candidate 9,522 votes. Since there was no constitutional provision for settling such contests, Congress, after a long and menacing debate, created an Electoral Commission (q.v.) which ultimately awarded all the disputed votes, by a strict party alignment, to Hayes and Wheeler, who were declared elected. Thus a great political crisis, akin in importance to that of the election of 1860, was peacefully passed.

The history of political parties in the twenty years following the centennial year, 1876, is marked by three distinct and increasing tendencies: First, the disappearance of the elaborate re-assertion of the rights of in-

dividuals and States in the party declarations in platform and in the campaigns, and the substitution of statements and discussions of economic and social matters, other than the tariff, such as monopolies, trusts, paper money, bi-metallism, free coinage of silver, labor unions, immigration, temperance; second, the development of independence in voting in national and local elections, and the formation of more or less permanent minor parties emphasizing one or more of the economic or social issues; and third, the progress of civil service reform, the merit system of appointing to civil office, in Federal, State, and municipal governments. The extent of the change wrought by the first tendency is shown by the fact that the most important issue in 1896, the one over which the two great parties waged their campaign warfare, was the coinage question, 'free and unlimited coinage of silver' vs. the gold standard. The movement for civil service reform, begun in 1871, and renewed under the Act of 1883, pursued an uneven, but on the whole, upward way, in spite of defiance by political leaders, connivance of cabinet officers, and luke-warm support by presidents; by 1896, more than 30 per cent. of the executive civil service was placed beyond the reach of the partisan spoilsman, and at the end of another decade the figure was nearly 50 per cent.

The independent vote in the old parties, more than the rise of independent parties, affected the results of Presidential elections, specially in 1884 and 1892. Even in 1880 it had made the popular votes for the candidates of the two great parties almost equal in a total of nearly ten million. J. A. Garfield (q.v.), the Republican candidate in 1880, was nominated on the thirty-sixth ballot after a fierce struggle in the convention in which General Grant received steadily 306 for a nomination for a third term; C. A. Arthur (q.v.) of New York was nominated for Vice-President as a concession to the Grant machine in New York. General W. S. Hancock (q.v.) of Pennsylvania, was the Democratic candidate, upon a terse, strict construction platform. Garfield was elected by an electoral vote of 214, and a popular vote of 4,454,416, over Hancock, who received 155 electoral votes and 4,444,952 popular votes. The next election was a triumph for the independent voters. To the Republican ticket, J. G. Blaine (q.v.) of Maine, and J. A. Logan (q.v.) of Illinois, the reform element of the party was irreconcilably opposed. Under the leadership of Carl Schurz and George W. Curtis and others, these 'independents'—dubbed 'Mugwumps' from an Algonquin word meaning 'chief'—protested, publicly rejected the nominees of their party, and finally endorsed the Democratic candidate, Grover Cleveland (q.v.) of New York, who had been elected governor of that State on a reform issue, by the phenomenal plurality of 192,000. The Democratic ticket was elected by

an electoral vote of 219 to 182 (carrying New York by a plurality of 1149), and a popular vote of 4,874,986 to 4,851,981.

The independent parties were more numerous than powerful between 1872 and 1892. The Prohibition party, which has continued to make regular nominations since 1872, reached its maximum in 1892 when Bidwell received 264,133 votes, though as a State and local issue it assumed great importance in Southern and certain Middle Western States in 1907 and 1908. The economic-social parties, beginning with the 'Greenback' agitations of 1876, and of 1880 when J. B. Weaver (q.v.) of Iowa received 307,000 votes, took various names: Anti-Monopoly, National, Labor, Union Labor, United Labor, Social Democrat, National Democrat, Socialist Labor, Socialist, Peoples, Populist. With the exception of 1892 and 1904 and 1908 the votes of none of these parties for their presidential candidates ever passed 350,000, and not infrequently fell below 100,000 in a total of 12,000,000. Their chief importance lay, as is often the case with positive radicals, in the recognition of their principles extorted from the platform-makers of the old parties, for example in the Democratic platform of 1896. The largest vote polled by any of these candidates was for James B. Weaver, nominee of the People's, or 'Populist' party in 1892, upon a fiery, radical, denunciatory platform. He received a popular vote of 1,040,886, and 22 electoral votes including those of the states of Kansas, Colorado, Nevada and Idaho. In the election of 1900, however, the combined vote of the five minor parties was less than 400,000 in a total of nearly 14,000,000.

The twelve years from 1884 to 1896 are without special significance in the development of parties, save that the Republicans stand more staunchly than before for high protective tariff, while the Democrats advocate a reduction of the tariff looking to free trade, and save, also, that the panic of 1893-4 led to a clearer alignment of the old parties on the questions of currency and finance. The votes in the two elections are as follows:

	Electoral.	Popular
1888—Harrison, Rep.	233	5,440,216
Cleveland, Dem.	168	5,538,233
Fisk, Prohib.		249,907
Streeter, Un. Labor		148,105
1892—Cleveland, Dem.	277	5,556,918
Harrison, Rep.	145	5,176,108
Weaver, People's	22	1,041,028
Bidwell, Prohib.		264,133

The Democratic platform of 1896 embodied the most radical statements ever incorporated in the declarations of that great party, and its candidate, W. J. Bryan (q.v.) of Nebraska, so well represented these that he received the endorsement of the National Silver party

and of the People's (Populist) party. The latter party refused to accept the Democratic nominee for Vice-President, Arthur Sewall, a rich ship-builder of Maine, and nominated T. E. Watson (q.v.) of Georgia in his stead, and secured for him 27 electoral votes. The chief features of the Democratic platform were declarations in favor of the free and unlimited coinage of silver at the ratio of 16 to 1; of legislation to prevent the future demonetization of any kind of legal tender by private contract; of such a reconstruction of the Supreme Court of the United States as would enable it to reverse its decision on the income tax, and of restricting immigration; and, denunciation of Federal interference to quell disturbances in the States, of 'government by injunction,' of the issue of interest-bearing bonds in time of peace, and of the issue of legal tender paper money by banks. So many prominent men in the party objected to this platform, that a National Democratic Convention was held, and J. M. Palmer of Illinois was nominated for the Presidency on a platform favoring the single gold standard, a tariff for revenue only, the retirement of government paper money, and the independence of the courts from political interference.

The Republican convention in St. Louis nominated William McKinley (q.v.) of Ohio on a platform favoring protection and reciprocity ('twin measures of the Republican policy'), a gold standard until bimetallism could be established by international agreement, and a firm, vigorous, and dignified foreign policy, together with the usual declarations of traditional principles of the party. The campaign, one of the most exciting since that of 1860, resulted in the election of the Republican ticket:

	Electoral.	Popular.
McKinley, Rep.	217	7,104,779
Bryan, Dem. and Peop.	176	6,502,925
Sewall, Dem. vice-p.	149	
Watson, Peop. vice-p.	27	
Palmer, Nat. Dem.		133,148
Levering, Prohib.		132,007
Two minor candidates		50,243

Two new issues arose in the eight years following the election of McKinley. The victory of the United States in the war with Spain in 1898, reluctantly undertaken to redress the wrongs of Cuba, put the United States in possession of the Philippines, Cuba, Porto Rico, and several other islands, beside the Hawaiian Islands which were in the meantime acquired by action of Congress. The United States was thus temporarily, at least, committed to a new sort of colonial policy, denounced by its opponents as 'imperialism,' and was compelled by circumstances to assume a new and more prominent rôle as one of the great powers of the world, practically reversing the conditions of 1798 and the early years of the Republic, when party politics were so

largely determined by foreign interference and foreign domination. In the midst of the discussion of these matters, Bryan was again defeated, even more decisively than in 1896, by McKinley with Theodore Roosevelt (q.v.), governor of New York, as candidate for Vice-President. McKinley received 292 electoral votes to Bryan's 155, and 7,207,923 popular votes to Bryan's 6,358,133.

By the assassination of President McKinley in September, 1901, Roosevelt became President. In foreign affairs he developed even further the policies of McKinley, giving Cuba nominal independence under a sort of protectorate by the United States, and recognizing with promptness the new Republic of Panama; in domestic affairs, he entered upon a vigorous and aggressive enforcement of the laws against trusts and combinations, and urged upon Congress further legislation for the control of great corporations, particularly interstate railroads.

The campaign of 1904 turned more upon personalities, and less upon platforms and party professions, than any other campaign since the time of Andrew Jackson. The Republicans nominated President Roosevelt with C. W. Fairbanks of Indiana, as Vice-President, the real platform being the challenge of the administration for a vote of confidence in its motives, methods, and efficiency. The Democratic convention proved one of the most exciting in years; the radical element, under the leadership of Bryan, was defeated, the money issue was dropped, anti-imperialism was much toned down, and A. B. Parker of New York, an able, upright judge, but little known outside his own State, was nominated for President, with H. G. Davis, an aged millionaire of West Virginia, for Vice-President. The result was as follows:

	Electoral.	Popular.
Roosevelt, Rep.	336	7,623,486
Parker, Dem.	140	5,077,971
Debs, Socialist		402,283
Swallow, Prohib.		258,536
Watson, People's		117,183
Corrigan, Soc. Labor		31,249

While Roosevelt's popular vote and popular majority were the largest ever recorded for any President up to that time, it is remarkable, and indicative of the increasing independence of the voters, that five States which gave Roosevelt large majorities elected Democratic governors: Massachusetts, Minnesota, Missouri, Colorado, and Montana. The same zeal for thoroughgoing reform and an appreciation of the personal character of candidate has greatly affected State and municipal elections, resulting in the overthrow of bosses and machines and a permanent elevation of popular political standards for parties and for administration.

In 1908 the Republican party nominated Secretary of

War William Howard Taft of Ohio, for president and Congressman James S. Sherman, of New York, for Vice-President. The Democratic party for the third time selected William J. Bryan as its Presidential candidate and John W. Kern, of Indiana, for Vice-President. The Socialists nominated Eugene V. Debs, of Indiana, and Ben Hanford, of New York; the Populists Thomas E. Watson, of Georgia, and Samuel W. Williams, of Indiana; and the Prohibitionists Eugene W. Chafin, of Illinois, and Aaron S. Watkins, of Ohio. This election witnessed the entry of a new party into the political arena—the Independence party, of which William R. Hearst, of New York, was the chief factor, and of which Thomas L. Hisgen, of Massachusetts, and John T. Graves, of New York (formerly of Georgia), were the candidates. The results of this election were as follows:

	Electoral.	Popular.
Taft, Rep.	321	7,637,676
Bryan, Dem.	162	6,393,182
Debs, Soc.		448,453
Chafin, Prohib.		241,252
Hisgen, Indep.		83,183
Watson, Pop.		33,871
Gillhaus, Soc. Lab.		15,421

This election was remarkable in that nearly 1,350,000 more votes were cast than in the election of 1904. Taft received a popular vote exceeding that of Roosevelt by over 14,000; Bryan received over 1,300,000 votes more than his predecessor, Parker; and the Socialist vote increased more than 45,000. On the other hand the Prohibition vote was more than 17,000 less than that of 1904; the Populist vote was over 83,000 behind the vote of 1904; and the Socialist-Labor candidate received less than 50 per cent. of the vote of his predecessor. In this election the independence of the voters was again manifested as it had been in 1904, several States which gave Taft majorities electing Democratic governors, notably Indiana, Minnesota, and Ohio. Also several States that had previously been Republican in gubernatorial elections changed to the Democratic column, notably Colorado, Nebraska and Ohio, while the usually Democratic Missouri elected a Republican governor. Oklahoma, with seven electoral votes, had been admitted as a State since the election of 1904, thus increasing the electoral vote to 483 and raising the majority necessary to a choice from 239 to 242.

POLITICAN SCIENCE: in the strict sense of the words, the science of politics, or science of government, as distinguished from the art or practice of politics, or government. The term *Politics* as commonly used, includes both the science and the art or practice of government. Used in this strict sense, therefore, Political Science is the science which deals with the relations of man regarded as a member of a state, as a member

of a political community. So regarded, it has for its field of discussion:

I. Abstract Political Science—the nature of the state in general, and the objects or ends of the same, including, therefore, what is usually called political theory or theory of the state.

II. Concrete Political Science—a study of the organization of actually existing states, including: (1) The methods by which the constitutions or fundamental laws of these states are made and changed; (2) the organization of the different departments of the government and their relation to each other; and (3) the relation of the government and the officials of the government to the individual citizen or inhabitant of the territory occupied by the state in question, including thereby a determination of the rights of the citizen over against the government and its officials, thus defining the sphere of individual liberty which is enjoyed by the citizens or inhabitants of the particular state. The object in view, of course, is the comparison of the different forms as they exist, with a view to determining in that way, as well as by means of the results attained by abstract political science, the proper organization of state.

Political science is, however, often conceived of as having a broader field, and when used in that sense the phrase includes both political science in the narrow sense as above set forth, and certain closely related fields of study, such as political economy, sociology, etc. This use of the term is becoming, perhaps, less common than it was formerly, though in one of the leading American universities, history, economics, sociology, diplomacy, public law and jurisprudence continue to be grouped together as 'Political Science' under a faculty bearing that name.

International law and diplomacy, the study of the relation of different states to each other, may well be classed as portions of political science in the narrower sense, especially as the binding effect of rules of international law becomes more and more to be recognized. Thus conceived, political science is the science which has for its field the study of man regarded as the member of a state, and of the relations of these states to one another. In this sense it differs from public law (constitutional, administrative, and international law) in that the political scientist is engaged in a study of the rules of public law primarily as a portion of the rules which determine the governmental organization, and not as rules which courts enforce on behalf of individual citizens, while the student of public law is concerned primarily with the same rules as rules of conduct enforced by the courts in protecting the individual against the illegal or oppressive acts of the government and its officials.

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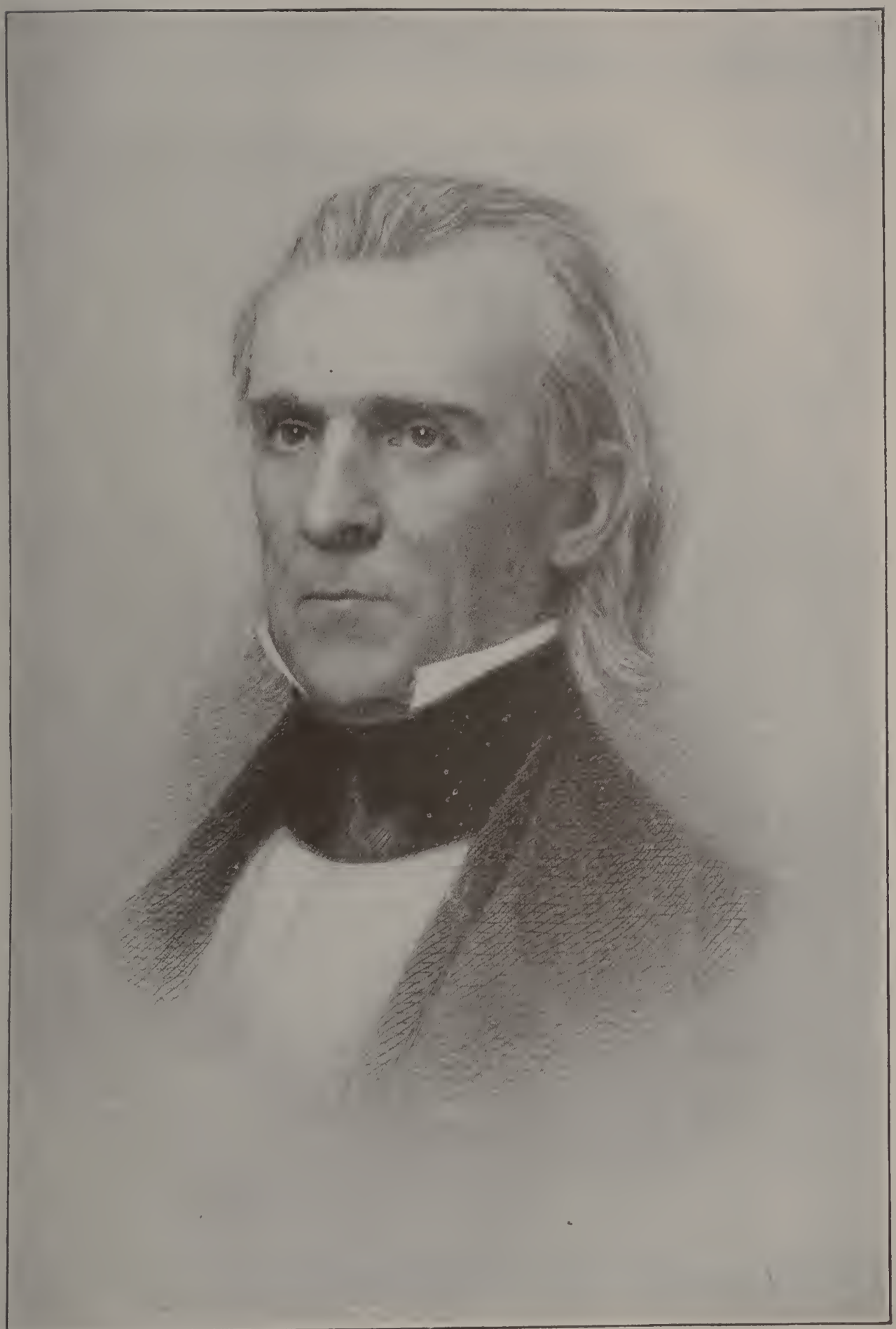
POLIZIANO, *po-lē-tse-â'no,* ANGELO, known often under the Latin form POLITIANUS (anglacized POLITIAN): 1454, July 14—1494, Sep. 24; b. Montepulciano, in Tuscany; son of a doctor of civil law. The family name was Ambroginis, but Poliziano took his from his native town—in Latin, *Mons Politianus.* At the age of 15 he published his famous *Stanze* (1,400 lines), in honor of Giulio de' Medici. In 1884 he accompanied the Florence ambassadors to Rome, and at the pope's request he translated (into Latin) the Greek historian Herodianus, for which he received 200 golden crowns. He made Latin versions of the *Enchiridion* of Epictetus, the *Charmides* of Plato, and other works, with such elegance, that Erasmus pronounced him a master in translation. After having filled for some years a chair of Latin literature, he began teaching Greek. Pupils came to him from all the great cities of Italy, and even from distant parts of Europe. In 1489 appeared his *Miscellanea,* a collection of critical and other observations on the ancient authors. Toward the close of his life, he entered into priest's orders, and was made canon of the Cathedral of Florence. Among the brilliant scholars of the classical Renaissance, P. occupies a foremost place in virtue of his vigor and originality. His intellect was penetrated by admiration of the chaste and noble literature of antiquity, but there was nothing servile in his imitations; his Latin poems, especially his elegies, display the beauty and ardor of his imagination. Among his vernac-

ular pieces are his *Canti Carnascialeschi* (Carnival, or Merry Ballads), remarkable for felicity of style, pathos, and abundant imagery. His *Orfeo* was one of the earliest dramatic compositions produced in Italy. The editions of P.'s separate writings have been numberless. See Seraszi's *Vita di A. Politiano;* N. A. Bonafous *De A. Politiani Vita et Operibus* (Paris 1845); Tiraboschi's *Storia della Litterat. Italiana;* Greswell's *Memoirs of Politiano*, and Roscoe's *Lives of Lorenzo de' Medici and of Leo X.*

POLK, *pōk*, James Knox: eleventh president of the United States: 1795, Nov. 2—1849, June 15; b. Mecklenburg co., N. C.; descended from an Irish family named Pollock, that had immigrated into this country several generations before. His father was a farmer, and his early advantages not great. Entering the Univ. of N. C., he graduated 1818, and was admitted to practice law two years later. At the age of 28, he was elected to the state legislature; and, at 30, to congress, where he joined in the strong opposition to Pres. John Quincy Adams. He was twice elected speaker, 1835 and 37, continuing in congress until 1839, when he was elected gov. of Tenn. At the democratic convention in Baltimore 1844, he was nominated for pres., and was elected over the whig candidate, Henry Clay. The most notable members of his cabinet were James Buchanan, sec. of state; Robert J. Walker, sec. of the treasury; William L. Marcy, sec. of war; and George Bancroft, sec. of the navy, succeeded by John Y. Mason. The Mexican and Oregon boundary questions and their settlement were the chief events of his administration. After the recognition of the independence of Texas by Mexico, the Mexican govt. claimed the territory between the Nueces and the Rio Grande, against the claim of Texas. In 1837 the application of Texas to be annexed was opposed by Pres. Van Buren as a breach of amity with the neighboring republic. His successor, Pres. Tyler, earnestly pursued the plan of annexation, and this policy was inherited by Pres. Polk, under whose administration congress proceeded to annex, the question of boundary being expressly stated as one yet to be adjusted. It was, however, only two days after the act of annexation, 1845, July 4, that Pres. P., by request of congress, sent Gen. Taylor to the defense of Texas; and the gen., by advice received there, occupied the disputed ground. Futile negotiations intervened, and Gen. Taylor advanced to the Rio Grande, facing the Mexican troops, which made the first attack. In judging the course of Pres. P., the logic of events must thus be considered; but he was at least responsible indirectly for the action of his subordinates in seizing the ground in dispute; he could, as *ex-officio* commander-in-chief, have prevented it by cautionary instructions; and he would have done so if he had possessed the firm and high sense of honor manifested by Pres. Van Buren in our relations with Mexico. A large part of the responsibility for the Mexican war rests upon P. He has been further criticised, and by army men, for his neglect to make due provision for the army at that time, especially for failing to fill the



JAMES K. POLK.

skeleton regiments, thus prolonging the struggle, and bringing disaster in its inception.—The economical and administrative changes during his presidency were principally the adoption of the low tariff of 1846, the collection and management of revenue without the assistance of banks, and the establishment of the dept. of the Interior. Pres. P. retired after one term of service, having pledged himself at his nomination to decline re-election. Soon after his retirement, he fell ill, and died at Nashville, Tenn. He was held in much esteem for his excellent personal traits; but, as an occupant of the highest office in the republic, he must be classed with a number of others who have been elected quite as much for negative as for positive qualities, and have been but the instruments of whatever policies led to their nomination.

POLK, Leonidas, d.d.: bishop of the Prot. Episc. Chh., and Confederate general: 1806, Apr. 10—1864, June 14; b. Raleigh, N. C. He was graduated at West Point Milit. Acad. 1827; but the same year resigned his lieutenancy in the artillery, and applied himself to preparation for ministry in the Prot. Episc. Church, taking orders 1830. In 1838 he was appointed missionary bp. of Arkansas, with oversight provisionally of missions from Ala. to Tex.; and three years later he became bp. of La. At the opening of the war of secession, he offered his services to the Confederacy, was appointed maj.gen., and placed in command of the Mississippi from the Arkansas to the Ohio river. He constructed fortifications, such as Forts Donelson and Henry. Joining Gen. A. S. Johnston, he participated in the battle of Shiloh; and later, under Gen. Bragg, in the battles of Perryville, Murfreesboro, and Chickamauga. In 1864 he commanded the dept. of the Mississippi, having been promoted lieut.gen.; was at the head of an army-corps in subsequent operations, and took part in the Atlanta movements. He was killed by a cannon-shot while making a reconnaissance on Pine Mountain, near Marietta, Ga. Retaining his ecclesiastical office to the end, he revived the mediæval traditions-of warrior bishops.

POLK, Thomas: patriot: about 1732–93; great-grandson of Robert P. or Pollock, who emigrated from Ireland and settled in Md. In 1753 Thomas left Penn., whither his father had removed, and settled in Mecklenburg co., N. C. In 1769 and 71 he was a member of the provincial assembly. In 1775 he issued the summons for election of the delegates who framed the Mecklenburg Declaration of Independence (q.v.), took an active part in the revolution, commanding a battalion of minute men, and later the 4th regt. in the army of Washington. P. was offered by Gen. Greene a commission as brig.gen., but as he had incurred the displeasure of Gen. Gates, the commission was never confirmed. At his death in Charlotte, N. C., he owned large and valuable estates acquired by purchase from the soldiers of the land warrants issued to them for their services.

POLK, William: 1758, July 9—1834, Jan. 4; b. in Mecklenburg co., N. C.: patriot; son of Thomas P. While in college at Charlotte he received a commisson as 2d lieut. in the 3d S C. regt. of the revolutionary army. In 1776 he was elected major of the 9th N. C. regt. in the army of Washington. He was in the battles of Brandywine, Germantown, Eutaw Springs, and Camden, and was twice badly wounded. He was in active service until the close of the war, after which he was a member of the N. C. legislative assembly. In 1812 he was appointed by President Madison brig.gen. in the U. S. army, but declined the commission for political reasons. On Lafayette's visit to this country 1824, P. was one of the commissioners to receive him. He outlived all the other revolutionary field officers of his state, and died in Raleigh.

POLKA, n. *pōl'kă* [Bohem. *pulka*, half]: dance of Polish or Hungarian origin, performed by two persons in $\frac{2}{4}$ time, and so called from the half-step characteristic of it; the air played to the dance. This dance has the rhythmical peculiarity of being accented on the third quarter of the measure. It became fashionable in w. Europe and in the United States about 1841. Polk, v. *pōlk*, to dance the polka. Polk'ing, imp. Polked, pp. *pōlkt*. Polka-jacket, a kind of knitted jacket worn by women.

POLL, n. *pōl* [Low. Ger. *polle*, head: Dut. *polle*, head, top: Icel. *kollr*, top, stump, head: Sp. *cholla*, skull: Icel. *bolr*, the trunk—from *bola*, to cut off]: the head; the back part of the head; a register of heads or persons; the entry of the names of persons qualified to vote for civil officers and members of parliament; an election of civil officers, or the place where the votes are taken: V. to lop or cut off the head, as of a tree; to clip or cut off hair or wool; to shear; to enter a person's name in a list or register of voters; to receive or give votes. Poll'ing, imp.: Adj. receiving or riving votes, as a *polling*-clerk; designating the place where votes are given, as a *polling*-place. Polled, pp. *pōld*, cropped; brought to the poll, as votes: Adj. lopped, as trees; shorn. Poll-book, a register of persons who can exercise the franchise, or who have exercised it. Poll-clerk, a clerk who enters the names of voters at an election as they appear to give their vote. Poll evil, a swelling on the head or nape of the neck in horses. Poll-tax, a sum of money exacted from each person or head as a tax (see Capitation). A polled cow, a hornless cow. Polled cattle, hornless cattle, a mixed breed of Scotch cattle.

POLL, n. *pŏl* [Gr. *hoi polloi*, the many]: a term applied at Cambridge to those men who do not take honors, but who only pass the examination required for a degree.

POLLACK, n. *pŏl'lăk*, or Pollock, *-lŏk* [Gael. *pollag*, the whiting; Ir. *pullog*, pollack], (*Merlangus pollachius*): fish of family *Gadidæ*, of same genus with the whiting and coal-fish: common on British coasts. It is very playful, often gamboling on the surface of the water. It attains about the same size as the coal-fish. It has three dor-

sal fins; the body is of longish shape; lower jaw much longer than the upper; tail slightly forked. The flesh is reckoned superior to that of the coal-fish. Young pollacks are sold sometimes as whitings, to which, however, they are not nearly equal. No fish more readily rises to the artificial fly. The fly is merely a bit of white feather tied to a common bait-hook. Worsted is sometimes used instead of the feather; and flies of different colors are sometimes used together, with great success. No reel is employed, and any stick is good enough for a rod; a few yards of string make a sufficient line.—The COMMON POLLACK (*M. purpureus*) of the N. England coast is brownish-green above and white below, 1–3 ft. in length; much esteemed for food.—The BLACK POLLACK or COAL-FISH (*M. carbonarius*), named from its black back, is of like size, and ranges from N. Y. northward.

POLL-ACT, *pōl′ăkt:* sanguinary act, passed at Trim in Ireland, by the Junto of the Pale 1465, under the Earl of Desmond, deputy. It ordained 'that it shall be lawful to all manner of men that find any theeves robbing by day or night, or going or coming to rob or steal, or any persons going or coming, having no faithful man of good name and fame in their company in English apparel, that it shall be lawful to take and kill those, and to cut off their heads, without any impeachment of our sovereign lord the king. And of any head so cut off in the county of Meath, that the cutter and his ayders there to him cause the saed head so cut off to be brought to the portreffe to put it upon a stake or spear, upon the Castle of Trim, and that the saed portreffe shall testify the bringing of the same to him. And that it shall be lawful for the saed bringer of the saed head to distrain and levy by his hand (as his reward) of every man having one ploughland in the barony, two pence; and of every man having half a ploughland, one penny; and of every man having an house and goods, value forty shillings, one penny; and of every cottier having one house and smoak, one halfpenny.' Much slaughter is said to have been committed under this remarkable act.

POLLAIUOLO, *pŏl-lâ-yô-ō′lō*, ANTONIO: Italian painter, sculptor, and goldsmith: b. Florence 1429; d. Rome 1498. He was a pupil of Donatello and Paolo Ucello, sculptor. Chiefly known as a sculptor, his paintings, however, have a distinct place in the development of Italian art from their power in the expression of action, this quality best exhibited in his *Hercules Strangling Antæus* in the Uffizi, and the *David* at Berlin. His other occupations lend a certain character of hardness to his painting, which also exhibits his superior knowledge of anatomy, he being the first to study from dissection. His brother PIETRO: b. Florence 1443; d. there 1496, was associated with him in all his works, and

did much independent painting. Pictures assigned to him are the *Annunciation* in Berlin, and a fresco of Saint Christopher in the Metropolitan Museum, New York.

POLLAIUOLO, Simone del ('Il Cronaca'): Italian architect; b. Florence 1457; d. 1508. He studied the architectural remains of antiquity at Rome for a number of years before undertaking any original work; and his constant habit of describing them to his friends, after his return to Florence, won for him the title 'Il Cronaca,' (the Chronicler'). His masterpiece is the cornice added to the façade of the Palazzo Strozzi, of which he had been appointed architect. He built at Florence the Palazzo Guadagni and the Church of San Salvador al Monte, also the Sacristy of San Spirito, the court of the Palazzo Strozzi, and the great hall of the Palazzo Vecchio. He must be looked upon as one of the leading architects of the original Renaissance style in Italy. Consult Geymüller-Stegmann, *Die Architektur der Renaissance in Toscana* (1885–96).

POLLAK, *pŏl'ak*, Gustav: American editor: b. Vienna, 1849, May 4. After a course of study in the schools of his native city, he came to the United States in 1866, where he has devoted himself largely to editorial work. A contributor to *The Nation* from 1874, he has written chiefly on foreign politics and literary subjects. He was cashier of *The Evening Post* 1881–93. In addition to copious work on leading encyclopædias, he has published: *On Success in Child Training; The Century Book for Mothers*, in which he was joint-editor; *Franz Grillparzer and the Austrian Drama* (1907); etc.

POLLAN, n. *pŏl'lăn* [Ir.], (*Coregonus Pollan;* see Coregonus): fresh-water fish of family *Salmonidæ*, native of lakes in Ireland, abundant particularly in Lough Neagh, where it is often seen in large shoals, which issue from the deep waters, and haunt the shore from spring to autumn, when great numbers are t ken by nets. The Pollan is 10 to 12 inches in length; it resembles the Gwyniad, but has not the snout produced like that fish; and there are differences in size and position of the fins. It is very like *Coregonus sikus*, a species found in the most n. parts of Norway. The spawn of the Pollan is deposited in November and December on the rocky or stony parts of the bottom of the lake which it inhabits. It is a well-flavored fish. The cry of 'Fresh Pollan' is even more common in Belfast during summer than that of 'Fresh Herring.'

POL'LANARRU'A: Ceylon, a ruined city and formerly capital of Ceylon, situated about 60 miles northeast of Candy. There are numerous large stone figures of Buddha, and remains of temples and other buildings. It flourished from the 8th to the beginning of the 13th century. It is now called Topare.

POLLARD, n. *pōl lérd* [from POLL 1]: a tree whose head has been lopped; a stag without horns—also applied to cattle; a clipped coin; a mixture of bran and meal; V. to poll, as trees. POL'LARDING, imp. (see below). POL'LARDED, pp. POLLARD-TREES, or POLLARDS, trees cut down so as to leave only the lower part of the trunk, which gives off numerous buds and branches. POLLARD, see WHEAT.

POLLARD, *pŏl'lard*, EDWARD ALBERT: American journalist and author: b. Nelson County, Va., 1828, Feb. 27; d. Lynchburg, Va., 1872, Dec. 12. He was graduated from the University of Virginia in 1849, removed to California where he engaged in journalism, and was preparing for the Episcopal ministry at the outbreak of the Civil war, throughout which he was editor of the Richmond *Examiner*. An ardent supporter of the Confederacy he was nevertheless a bitter and active opponent of Jefferson Davis. While endeavoring to run the blockade in 1865 on his way to England he was captured and imprisoned in Fort Monroe for eight months, when he was released by Gen. Butler. He was an able writer, but bitterly opinionated and unfair where his prejudices were concerned. Among his numerous works are: *Black Diamonds* (1859); *Southern History of the War* (1862); *The Lost Cause* (1866); *The Life of Jefferson Davis* (1869).

POLLARD, JOSEPHINE: American writer: b. New York 1842; d. there 1892, Aug. 15. She was an editorial writer on the *Sunday School Times* from the time of its establishment in 1876, and for 20 years was connected with the Methodist Book Concern. Her books are chiefly religious works and juvenile stories. Among them are: *The Gypsy Books* (1873–4); *Elfin Land* (1882), poems; *Gellivor, a Christmas Legend* (1882); *The Boston Tea Party* (1882); *Favorite Birds and What Poets Sing of Them* (1888); etc.

POLLARD, PERCIVAL: American author: b. Pomerania, Prussia, 1869. He came to the United States in 1885, engaged in journalism in 1891, and has since been engaged in editorial and literary work in Chicago and New York. Among his published works are: *The Cape of Storms* (1895); *Posters in Miniature* (1896); *Dreams of To-day* (1897); *The Imitator* (1902); *Lingo Dan* (1903); *Recollections of Oscar Wilde* (1906); etc.

POL'LARDING: cutting off the whole crown of a tree, leaving it to send out new branches from the top of the stem. The new branches are never equal in magnitude to the original branches of the tree, though often more numerous, and when pollarding is often repeated, the scars and stumps form a thick ring at the top of the stem, from which small branches spring. Pollards are not beautiful, but pollarding is practiced with advantage in districts where fuel is scarce, the branches being cut

off for fuel every third or fourth year. Willows, Poplars, Alders, Elms, Oaks, and Limes are the trees most frequently pollarded, and in parts of Europe the White Mulberry. Trees of most rapid growth are preferred where fuel is the object; and willows, poplars, and alders are planted along water-courses, and in rows in moist meadows and bogs. Oaks are sometimes pollarded chiefly for the bark of their branches, and the whole treatment resembles that of copse-wood. In parts of Germany, landscapes may be seen of open country with many scattered oak and elm pollards, presenting a very peculiar appearance.

POLLEN, n. *pŏl'lĕn* [L. *pollen*, fine flour: Gr. *palē*, the finest meal—from *pallō*, I sift by shaking: F. *pollen*, pollen]: fecundating powder or dust contained in the anthers of flowers and afterward dispersed on the stigma (see STAMEN: FECUNDATION): the bloom of leaves. POL'LENA'RIOUS, a. *-ā'rĭ-ŭs*, consisting of pollen or meal. POLLENIN, or POLLENINE, n. *pŏl'lĕn-ĭn*, peculiar substance obtained from the pollen of certain plants. POL'LINAR, a. *-lĭn-ar*, or POL'LINOSE, a. *-ōs*, covered with a very fine dust resembling pollen. POLLINIC, a. *pŏl-lĭn'ĭk*, pertaining to pollen. POLLINIFEROUS, a. *pŏl'lĭn-ĭf'ėr-ŭs* [L. *fero*, I bear]: bearing or containing pollen. POLLEN-MASS, or POLLINIA, n. *pŏl'lĭn'ĭ-ă*, an agglutinated mass of pollen, occurring in some other plants. POLLINATION, n. *pŏl'lĭ-nā'shŭn*, the conveyance of the pollen from the anthers to the stimga in Angiosperms, or to the nucleus in Gymnosperms. POLLINODIUM, n. *pŏl'lĭ-nō'dĭ-ŭm* [Gr. *eidos*, resemblance]: another name for the *antheriatum*, which see. POLLEN-TUBE, the tube emitted by the pollen-grain after it is applied to the stigma.

POLL EVIL, *pōl ē'vl:* disease affecting the horse. It appears as an inflamed swelling at the top of the head or nape of the neck, and is liable to develop into an almost incurable abscess. It may be caused by the pressure of a halter or bridle, a tight check-rein, or by any injury to the top of the head. As soon as the swelling appears, an effort should be made to reduce inflammation by the use of cold water, or a mixture of water, vinegar, and arnica; if a tumor forms it should be poulticed, or an ointment of lard and iodine applied; when matter forms, the tumor should be opened at its lowest point and lengthwise of the neck, the matter pressed out, and the cavity cleansed by frequent injection of tincture of iodine or a weak solution of chloride of zinc. The general health of the animal also must receive attention. When possible, a competent veterinarian should be consulted as soon as the disease appears.

POLLEX, n. *pŏl'lĕks* [L. *pollex*, the thumb]: the thumb in man; the innermost of the five normal digits of the anterior limb of the higher vertebrates.

POLLINCTOR n. *pŏl-lĭngk'tŏr* [L.—from *pollin'gĕrĕ*,

to lay out a corpse]: one who prepares materials for embalming the dead.

POLLIO, *pŏl'lĭ-ō*, Caius Asinius: politician, soldier, and author of some merit, and more reputation: B.C. 76—A.D. 4; b. Rome; of Marrucinian descent. His first ambition was to be an orator, and in his youth he seized every opportunity of hearing such men as Hortensius and Cicero. When civil war broke out between Cæsar and Pompey, Pollio sided with Cæsar, was present at the crossing of the Rubicon, and accompanied the great general in his rapid triumphal march through Italy. He joined Cæsar in his expedition to Greece against Pompey, and took part in the decisive battle of Pharsalia, B.C. 48. At the time of Cæsar's assassination (B.C. 44, Mar. 15), Pollio was governor of Hispania Ulterior (Further Spain), and carrying on the war against Sextus Pompey. In the subsequent struggles, he sided with the triumvirate (Antony, Lepidus, and Octavian) against the oligarchic senate; and on the triumph of the former, was appointed administrator of transpadane Gaul, in which capacity he saved the property of the poet Virgil at Mantua from confiscation. After Antony and Octavian had quarrelled, it was Pollio who affected their temporary reconciliation at Brundusium, B.C. 40; next year he conducted a successful campaign against the Parthini, a people of Illyria, and was granted a triumph therefor, after which he withdrew from political life. Pollio died at his Tusculan villa. Besides having a reputation for oratory Pollio was notable as historian, poet and critic, and the loss of his writings is to be regretted. His literary and political criticism of his contemporaries, in particular, appears to have been valuable. He was a distinguished patron of men of letters, such as Catullus, Horace, Virgil; and was founder of the first public library at Rome.

POLLNITZ, *pol'nĭtz*, Karl Ludwig, Freiherr Von: writer of memoirs: 1692, Feb. 25—1775, June 23; b. near Cologne. He was equally remarkable for talents and lack of principle; and while his father's position as minister of state to the Elector of Brandenburg gave him access to court-circles, his extravagance and eccentricity, coupled with his vagabond habits, often reduced him to the greatest poverty. But after wandering all over Europe, taking service in the church in Austria, and in the army in Spain, he finally attracted the favorable notice of Frederick the Great, who appointed him his reader, and made him director of the theatre at Berlin. After having twice changed from Rom. Catholicism to Calvanism, he proclaimed himself a member of the Church of Rome shortly before his death. Among the numerous memoirs, either written by or ascribed to him, the following were the most popular in their day: *Lettres et Mém., et la Relation de ses premiers Voyages* (Amst. 1735); *État abrêgé de Saxe sous Auguste III.* (Frankf. 1734); *Hist.*

secrète de la Duchesse d'Hanovre, épouse de George I. (Lond. 1732). After his death, Brunn brought out Pollio's *Mémoires pour servir á l'Historie des quatre derniers Souverains de la Maison de Brandenbourg* (2 tomes, Berl. 1792).

POLLOCK: see POLLACK.

POLLOCK, *pŏl'ŏk*, SIR CHARLES EDWARD, English judge and writer on law: b. 1823, Oct. 31; d. Putney, 1897, Nov. 21. He was called to the bar in 1847, was elected bencher of the Inner Temple in 1866, acquired large practice, took silk (that is, became Queen's counsel) in 1866, and was knighted in 1873. In the last-named year he was raised to the exchequer bench, and through the judicature acts received in 1875 the status of justice of the high court. Among his works were: *The Practice of the County Courts* (1851; subseq. eds., with supplements); and *A Treatise on the Power of the Courts of Common Law to Compel the Production of Documents for Inspection* (1851).

POLLOCK, SIR FREDERICK, LL.D., D.C.L.: English jurist: b. London, 1845, Dec. 10. He was educated at Eton and Cambridge; in 1871 was called to the bar of Lincoln's Inn; and in 1882–3 was professor of jurisprudence in University College, London. From 1883 to 1903 he occupied the chair of jurisprudence at Oxford, and during 1884–90 was professor of common law in the Inns of Court. Since 1895 he has been editor of the Law Reports. In 1888 he succeeded his father in the baronetcy. He has several times visited the United States and in the winter of 1903–4 delivered a course of lectures at the Lowell Institute, Boston. Among his published works are: *Principles of Contract* (1876; 7th ed., 1902); *Digest of the Law of Partnership* (1877; 8th ed., 1905); *Spinoza, His Life and Philosophy* (1880); *The Law of Torts* (1883); 7th ed., 1904); *The Land Laws* (3d ed., 1895); *Introduction to the History of the Science of Politics* (1890; 4th ed., 1902); *Oxford Lectures and Other Discourses* (1890); *Leading Cases Done into English, and Other Diversions,* a series of parodies of English poets as well as of typical cases at law (1892); *The Law of Fraud, etc., in British India* (1894); *A First Book of Jurisprudence* (1896; 2d ed., 1904); *The Etchingham Letters,* a novel in epistolary form (1899; with E. F. Maitland); etc. With F. W. Maitland he wrote a *History of English Law Before Edward I.* (1895; 2d ed., 1899).

POLLOCK, SIR GEORGE: English soldier: b. London, 1786, June 4; d. Walmer, 1872, Oct. 6. He was educated at Woolwich, entered the East Indian service as lieutenant of Bengal artillery, in 1835 became colonel commandant, and until his death retained this post. He commanded the Bengal artillery in the Burmese war of 1824, in 1842 was made commander of the armies west of the Indus, April 5 forced the Kyber pass, September 16 en-

tered Cabul. He was military member of the supreme council of India in 1844–5, a director of the East India Company in 1854–6, and held other offices. In 1859 he was made general, in 1870 field marshal.

POLLOCK, WALTER HERRIES: English journalish and author: b. 1850, Feb. 21. He is a brother of Sir F. Pollock (q.v.) and was educated at Eton and Cambridge. He was called to the bar at the Inner Temple in 1874, and from 1884 to 1894 was editor of the *Saturday Review.* He has published *Lectures on Freneh Poets* (1879); *The Picture's Secret,* a novel (1883); *Verse of Two Tongues* (1884); *A Nine Men's Morrice* (1889); *Old and New,* verse (1890); *Jane Austen; Her Contemporaries and Herself* (1899); etc.

POLLOK, *pŏl'ok,* ROBERT: Scottish poet: 1798–1827, Sep. 17; b. Muirhouse, parish of Eaglesham, county of Renfrew. After taking his degree at Glasgow Univ., he entered the Divinity Hall of the United Secession Church, where he studied five years; and in 1827 was licensed to preach, having already written *The Course of Time;* and its composition, together with his ardor in study, brought on consumption. The poem was published by Blackwood, 1827, Mar., and was highly praised, but the voice of praise fell on a dying ear. Pollok set out for Italy, but died at Shirley Common, near Southampton.

The Course of Time was immediately successful, and has run through more than 20 editions, and is extremely popular in Scotland. Its subject is the spiritual life of man, and his hereafter. It is a work of genius, but unequal in merit. Its ten 'books' contain eloquent and spirited passages, written with elevated feeling and diction, and with abundant enthusiasm and imagery; but considerable portions of it read like a dull sermon turned into blank verse. The writer drew his inspiration from nature, from Milton, and the Shorter Catechism—from the last, perhaps, most of all. His Memoir, by his brother, was published 1843. Pollok wrote *Tales of the Covenanters,* pub. anonymously

POLLUTE, v. *pŏl-lôt* [L. *pollūtus,* soiled or defiled—from *pollŭo,* I defile]: to make foul or unclean; to defile; to taint with gilt; to corrupt; to vitiate; to violate. POLLU'TING, imp.: ADJ. adapted or tending to defile or taint. POLLU'TED, *pp.*: ADJ. rendered unclean; defiled; tainted with guilt. POLLU'TEDLY, ad. *-lĭ,* in a polluted manner. POLLU'TEDNESS, n., *-nĕs,* the state of being polluted; defilement. POLLU'TINGLY, ad. *-lĭ,* corruptingly. POLLU'TER, n. *-tèr,* one who pollutes. POLLUTION, n. *pŏ-lū'shŭn,* act of polluting; defilement; uncleanness; impurity; in Scrip., guilt or idolatry.—SYN. of 'pollute': to contaminate; defile; taint; corrupt; soil; debauch; vitiate; abuse; ravish; violate; pervert.

POLLUX, n. *pŏl'lŭks* [in L. and Gr. myth., a famous pugilist, twin brother of Castor]: bright star of the sec-

ond magnitude in the constellation Gemini or the Twins, CASTOR AND POLLUX, in *geol.*, two closely allied minerals of the felspar family, resembling quartz in their hardness and transparency; in *astron.*, a constellation.—See CASTOR AND POLLUX.

POLLUX, *pŏl'lŭks*, JULIUS (real name POLYDEUCES): Greek grammarian and philosopher: about 130—about 188; b. at Naucratis, Egypt. He studied at Athens, and there he afterward taught grammar and rhetoric. His only work extant is the *Onomasticon*, a dictionary of Greek words which, instead of being in alphabetical order, are arranged by groups according to their subjects, and defined and illustrated by quotations from various writers. This work, which is of great value to Greek students, has been edited by a number of authors: the first edition appeared at Venice 1502, one by Hemsterhuys at Amsterdam 1706, another by Dindorf at Leipzig 1824, a fourth by Bekker at Berlin 1846. An elaborate treatise on Pollux and his work by Kirschoff was brought out at Berlin 1874. He was held in high esteem by the two emperors, Marcus Aurelius and Commodus, during whose reign he taught at Athens.

POLO, *pō'lō* [prob. altered form of Thibetan *pulu*, ball]: game in which the players mounted on horseback, endeavor with stout sticks curved at the ends, to strike a ball through a goal. Its original home seems to have been Thibet; but it is known and popular in most of the Himalayan countries. The game reached India through Afghanistan, and was speedily and eagerly taken up by members of the English cavalry regiments. It was introduced into England about 1871, and subsequently found its way to the United States. Although the rules vary in minor particulars, they are everywhere substantially identical.

The game may be briefly described as follows: The grounds form a parallelogram not less than 900 feet long, and 450 feet wide; the goal at each end being 8 yards wide and marked by two posts. The ball used is 3 inches in diameter, and the sticks are each 4 feet long with a cross-piece on the head. The stick is not long enough to touch a ball on the ground without the rider's stooping somewhat; and he must be prepared to stoop to right or left with equal readiness, and to drive the ball backward, forward, or sideways.

The players are mounted on specially trained ponies, which must be free from vice, and must not exceed 14 hands in height. From three to six persons can play on each side; in match games the number must be four. Two umpires are chosen, one for each side, and the ball is tossed into the middle of the field. The players take up their positions behind their respective goal-posts, and at the dropping of the flag they charge toward the ball, each side striving to reach and strike it first. If the ball is struck out of bounds, the nearest umpire returns it.

Match games last an hour and 10 minutes, with 5 minutes' rest after each 20 minutes' play. A player breaking his stick must himself fetch a new one; if he drops his stick, he must dismount and recover it, and while on the ground is forbidden to strike at the ball. A ball hit past but not through the goal, entitles the defending side to a 'hit off' from the goal line. One player on each side acts as goal-keeper, and remains at his goal. A player may impede his adversary with his stick; but must not reach under or over his opponent's pony. A player may interpose himself between his adversary and the ball; but not when he is in possession of the ball. The rules of the game in England and America differ materially, especially in the tendency of the English game to lessen the freedom of the player in order to increase safety; the game has always been popular with the British army officers, who have produced many of the leading experts. In America there exists a system of handicapping the players, thus giving the less experienced an equal chance. The demand for suitable ponies has developed the industry in the United States of breeding them through crossing the thoroughbred with the hardy Western ponies. In addition to horsemanship the game requires control of temper, quickness of observation, judgment, nerve, and endurance; the United States army has done much to encourage the game at the various army posts, and introduced it at the West Point Military Academy. The central authority on the game in the United States is the Polo Association, composed of 34 clubs located throughout the country; it forms the rules, regulates the handicapping, and arranges the tournaments, championships, and other matches.

POLO, *pō'lō*, MARCO: famous traveller: about 1254–1324; b. Venice; of a noble family of Dalmatian origin. His father, Nicolo Polo, and his uncle, Matteo Polo, both eminent merchants, had, previous to his birth, set out on a mercantile expedition, visiting Constantinople, Soldaya or Sondach (on the Euxine), and Bulgar (on the Volga), the capital of Barkäi, Khan of Keptchak. Thence they travelled round the n. side of the Caspian Sea to Bokhara, where they remained three years, studying the Mongol language and trading; but 1261, some ambassadors from the Perso Mogul khan to Kûblai (q.v.), Grand Khan of the Mongols, happening to pass through Bokhara, the brothers Polo resolved to accompany them to Kemenfu, the summer residence of the Khagan. They were well received by Kûblai, who had never before met European gentlemen. He was very inquisitive concerning the peoples and mode of government in Europe, and commissioned them to act as his envoys to the pope, bearing a written request for 100 Europeans, well learned in the sciences and arts, to act as instructors to the Mongols. They reached Venice 1269; but finding it impossible to discharge the mission with which they had

been intrusted, they set out on their return 1271, taking with them young Marco, and arrived again at the court of Kûblai Khan, 1275. Their second reception was still more honorable than the first, and the Khagan took special notice of Marco, from the rapidity with which he learned the customs and language of the Mongols. His wisdom and the nobility of his demeanor also recommended him as a fit envoy to the various neighboring rulers; and during his residence at their several courts Polo was in the habit of closely observing the manners and customs of the country, and delivering on his return a detailed report to the Khagan. These reports were the groundwork of the book which informs us regarding the state of central and eastern Asia in the end of the 13th c. Polo's first mission was to the court of Annam or Tonquin (1277), and during his residence there he acquired much information both from his own observation and from report, concerning Tibet, Yunnan, Bengal, Mien (or Pegu), and s. China; he was employed next to aid in making an inventory of the archives belonging to the court of the Song dynasty; and soon afterward was appointed gov. of the town of Yang-tchow, in the province of Kiang-si, in e. China, which post he held three years. He also accompanied a Mongol army to the attack of the kingdom of Pegu; and closed the list of services rendered to Kûblai by accepting the emabssy to Tsiampa, the s. part of Cochin-China. Having thus passed 17 years in the service of the Mongol khan, and visited the chief countries and cities of e. Asia, travelling through kingdoms (e.g., China) which no European had ever seen before, and acquiring much knowledge of other kingdoms (e.g., Japan, called by Polo *Zipangu*), the existence of which had not been even suspected, he succeeded in obtaining permission to join the escort of a Mongol princess who was traveling to the court of Persia. The three Polos accordingly set out 1291, travelling through China and thence, by sailing through the Chinese Sea and Indian Ocean, finally arrived at Teheran, where they stayed some time; but learning that Kûblai Khan was now dead, they continued their journey, and arrived at Venice 1295, bringing with them much wealth and many precious objects, the fruits of their trading. Marco, in the following year, commanded his own galley in the great battle of Curzola, in which the Venetians, under Dandolo, were defeated by the Genoese under Doria; and was taken prisoner and immured in a dungeon at Genoa. Here he dictated, with the aid of memoranda that he had made during his travels, an account of his journey through the East, which was subsequently revised with care. After his liberation he returned to Venice, where he was appointed member of the grand council; and in that city he died. Polo's narrative created an immense sensation among the learned public, and many did not hesitate to affirm that it was pure fiction; but the Rom.

Cath. missionaries and subsequent Venetian travellers into those remote regions verified many of Polo's statements, and then came a reaction of public opinion; Polo's wonderful minuteness, extensive research, and accuracy being the theme of universal admiration. His work was of inestimable value as a stimulant and guide in geographical research; it encouraged the Portuguese to find the way to Hindustan round the Cape of Good Hope; and it roused the passion for discovery in the breast of Columbus, thus leading to the two greatest of modern geographical discoveries. The first Italian edition appeared Venice 1496, and has been often reprinted. A critical edition was edited 1827 by Baldelli; a new one by Bartoli (1864). There are about 60 translations in various languages, including several English ones. But one of the best in any language is the standard English one by Col. Yule, *The Book of Marco Polo* (2 vols. 1871; new ed., 1875; rev. ed., 1904), with maps, plates, and learned annotations and illustrations, largely from oriental sources.

POL'OCK, Moses: American publisher and bookseller: b. Philadelphia, 1817, May 14; d. there 1903, Aug. 16. In his 14th year he began the book business, in which he continued until his death. He issued many books in fiction, the drama, and general literature, and in addition dealt in old and rare books, becoming an authority in Americana. His shop for half a century was frequented by book lovers, and his collections of Washingtoniana and books printed by Benjamin Franklin were particularly notable. He had a profound knowledge of early Pennsylvanian history.

POLO DE MEDINA, Salvador Jacinto: Spanish poet: b. Murcia about 1607; d. about 1660. After studying in Murcia he went in 1630 to Madrid to continue his studies, became a priest, and in 1638 became secretary to the Bishop of Lugo. His principal works are *Academias del Jardín; Buen humor de las musas;* and the fables *Apolo y Dafne* and *Pan y Siringa,* all of which appeared in 1630; *Hospital de incurables, viaje de este mundo al otro* (1630); and *Gobierno moral à Lelio,* a moral treatise (1657). His complete works, *Obras en prosa y versa,* were published at Saragossa in 1664.

POLONAISE, n. *pō'lŏ-nāz* [F. *polonais,* Polish]: a robe or dress adopted from the fashion of the Poles; in *music,* a movement of three crotchets in a bar; a dance adapted to such music; also Po'lonese, n. *-nēz'*, and Po'lonise', n. *-nīz'*. Po'lonese', n. the Polish language.

POLONIUM: an element discovered by Mme. Sklodowska Curie (1898) while examining some samples containing uranium obtained from the complex mineral pitch-blende. Mme. Curie named it polonium in memory of her native land, Poland. Pitch-blende is a peculiar and very complex mineral found principally in Joachimstahl, Bo-

hemia, Cornwall, England, and in some parts of this country, notably Colorado. It contains a large amount of the element uranium and is mined and worked over to obtain that element. It was from the refuse or waste left after the extraction of the uranium that Mme. Curie obtained polonium and afterward the far more important element radium. Polonium closely resembles bismuth in its chemical properties, so is found in company with that element when it is separated from the rest of the above refuse during the process of analysis. To separate the polonium from the bismuth is a matter of great difficulty and no sample of polonium has yet been obtained that is free or even approximately free of bismuth. The method usually used is that of fractional precipitation of the basic nitrates. A solution of the mixed nitrates of bismuth and polonium is made in concentrated nitric acid. Water is added until the liquid becomes cloudy. The white solid basic nitrates that separate at first contain a larger percentage of polonium than the original mixture dissolved in the acid. This process, repeated many times, gives a solid rich in polonium. The most important property of polonium is its radio-activity (see RADIUM). While radium gives off three kinds of rays or radiations called a, B and y, polonium appears to give only one variety, the a rays. Polonium loses its radio-activity slowly, thereby differing from radium. It should be noted that some noted investigators in this field of radio-active substances deny the existence of polonium, claiming it to be merely a radio-active form of bismuth, its radio-activity having been induced by its association with radium in the pitch-blende.

POLONY, n. *pō-lō′nĭ* [a corruption of *Bologna* sausage]: a kind of sausage.

POLOTSK, *pō-lŏtsk′:* town of w. Russia, govt. of Vitebsk, on the banks of the Düna, where that river is joined by the Polota. It was founded in the 9th c., is the seat of a bp. of the Greek United Church; and has several churches, a convent, and a school for the nobility. Here, 1812, the Russian general, Wittgenstein, defeated the French under Oudinot and Sire. Pop. 20,000.

POLTAVA, *pŏl′tâ′va:* government in Little Russia, between Kiev on the w. and Kharkov on the e.; 19,265 sq. m. The surface is flat, with gradual slope s.w. to the banks of the Dnieper, which forms the s. boundary, and into which the chief rivers—the Sula, Psiol, and Worskla—flow. The govt. does not abound in wood, but possesses rich and extensive pastures. The soil is mostly clay and fertile vegetable mold, and the climate is healthful. Agriculture and cattle-breeding are staple occupations. The manufactures are not numerous nor important. Commerce is chiefly in the hands of Jews, and is transacted mostly at the fairs, the most important of which are those of Poltava and Romny. Pop. about 3,000,000.

POLTA'VA: chief town of the govt. of P.; on the right bank of the Worskla, a tributary of the Dnieper, about 934 m. s.s.e. of St. Petersburg. P. has few manufactures, and its trade is active only during the four annual fairs. The most important fair, the Illinsky, lasts about a month. At these fairs, merchandise is exposed for sale worth $20,000,000. The principal articles of traffic are cloths, woolen tissues, colonial productions, fur, wool, horses, and agricultural produce and implements. P. is famous as the scene of Charles XII.'s defeat by Peter the Great 1709, and a monument commemorating the victory of the czar stands in the principal square; while three m. from the town a mound surmounted by a cross, still known as the 'Swedish Tomb,' marks the battle-field. P. has a cathedral, numerous churches, and a school for cadets. Pop. (1880) 34,000; (1890) 42,210; (1897) 53,060.

POLTROON, n. *pŏl-trôn'* [F. and Sp. *poltron*, a scoundrel, a coward—from It. *poltrone*, an idle fellow—from *poltra*, a bed to lie on during day; *poltrire*, to play the coward: Ger. *polster*, a mattress; *polterer*, a braggart]: a coward; one without courage. POLTROON'ERY, n. *-ĕr-ĭ*, baseness of mind; want of spirit; cowardice.—SYN. of 'poltroon': dastard; craven; coward; scoundrel.

POLVERINE, n. *pŏl'vĕr-ĭn* [It. *polverino*, ashes used in the making of glass—from *polvere*, dust—from L. *pulvis*, dust]: a kind of potash from the Levant, preferred in the manufacture of glass.

POLY-, *pŏl'ĭ-* [Gr. *polus*, many]: a common prefix, signifying 'many of; having many.'

POLYACOUSTIC, a. *pŏl'ĭ-ă-kows'tĭk* [Gr. *polus*, many; *akoustĭkos*, belonging to the sense of hearing—from *akouō*, I hear]: that multiplies or magnifies sounds.

POLYAD, n. *pŏl'ĭ-ăd* [Gr. *polus*, many]: in *chem.*, applied to an element consisting of more than one atom.

POLYADELPHIAN, a. *pŏl'ĭ-ă-dĕl'fĭ-ăn*, or POL'YADEL'PHOUS, a. *-fŭs* [Gr. *polus*, many; *adel'phos*, a brother]: in *bot.*, having the stamens united in three or more bundles or parcels, as in the class of plants POL'YADEL'PHIA, *-fĭ-ă*.

POLYADELPHOUS: see POLYADELPHIAN.

POLYANDRIAN, a. *pŏl'ĭ-ăn'drĭ-ăn*, or POL'YAN'DROUS, a. *-drŭs* [Gr. *polus*, many; *anēr*, or *andra*, a man]: in *bot.*, having many stamens, or any number above twenty; belonging to the class POL'YAN'DRIA, *-drĭ-ă*.

POLYANDRY, n. *pŏl'ĭ-ăn'drĭ* [see POLYANDRIAN]: practice of women having more than one husband at the same time; the opposite of *polygamy* (see MARRIAGE). POL'YAN'DRIC, a. *-drĭk*, relating to polyandry; mating with several males.—*Polyandry* has its chief seat in Tibet. There a wife commonly is the wife of a whole family of brothers—the elder brother being chief husband. In the Himalayan and sub-Himalayan regions adjoining and under the influence of Tibet it is of frequent occurrence in the same form, as in the valley of Kashmir, in Ladak, among the Kooch, among the Telingese. Further s. in India, P. is

found among the Tudas of the Neilgherry Hills, the Coorgs of Mysore, and the Nayars of Malabar. It is found again off the Indian coast in Ceylon; and eastward it is an ancient though now almost superseded custom in New Zealand, and in one or two of the Pacific islands. Northward it is found in the Aleutian Islands; and on the Amer. continent w. and n. of the Aleutians, among the Koryaks, n. of the Okhotsk Sea. In the Russian empire on the w. side, it is found among the Saporogian Cossacks: thus it can be traced at points half round the globe. But further, it exists in several parts of Africa; and it occurs again in many parts of America among the red men. We have the authority of Humboldt for its prevalence among the tribes on the Orinoco, and in the same form as in Tibet. 'Among the Avaroes and the Maypures,' he says, 'brothers have often but one wife.' Humboldt also vouches for its former prevalence in Lancerota, one of the Canary Islands. Thus, P. is a phenomenon of human life independent of race and country.—See Latham's *Descriptive Ethnology* (1859), I. 24, 28; II. 398, 406, and 462; Humboldt's *Personal Narrative*, Williams's translation, 1819, V. part 2, p. 549; and chap. i. vol. I. p. 84; Hamilton's *New Account of the East Indies* (Edin. 1727), I. 274 and 308; Reade's *Savage Africa*, p. 43; Erman's *Travels in Siberia*, II. 531; *Marriage Ceremonies*, by Seignior Gaya (translation), 2d ed. (Lond. 1698), 70, 96; Emerson Tennent's *Ceylon*, 3d ed. (1859), II. 429; Grey's *Polynesian Mythology*, 1855, p. 81; *A Summer Ramble in the Himalayas* (1860); Vigne's *Kashmir; Journal Asi. Soc. Bengal*, IX.; *Asiat. Resch.*, V.; also M'Lennan's *Primitive Marriage* (1865); Herbert Spencer's *Principles of Sociology* (1876).

From ancient history we learn that the area over which P. at one time existed was even more extended; while in certain cantons of Media, according to Strabo (II. 798, and see Goguet, III. book vi. c. i.) polygynia was authorized by express law, which ordained every inhabitant to maintain at least seven wives; in other cantons, precisely the opposite rule prevailed: a woman was allowed to have many husbands, and they looked with contempt on those who had less than five. Cæsar informs us that in his time P. of the Tibetan type prevailed among the Britons (*De Bello Gallico*, lib. v. c. xiv.). There is direct evidence of its existence among the Picts in the Irish Nennius App. li., besides the traces of it remaining in the Pictish laws of succession. Indeed, to pass over communities in which something like promiscuity of intercourse between the sexes is said to have prevailed—such as the Massagetæ, Agathyrsi, and the ancient Spartans—we find several among which P., or a modified promiscuity, must have been the rule. Some, assuming (though this assumption seems scarcely warranted) that the legal obligation laid on younger brothers in their turn to marry the wives of their deceased elder brother, is a relic of P. of the Tibetan type, hold that P. prevailed at one time throughout India (*Institutes of Menu*, iii. s. 173, and ix. ss. 57, 58), among the ancient Hebrews (Deut. xxv. 5–11); in Siam, Burmah, in Syria among the Ostiaks,

the But (Bodo), the Kasia, and the Puharies of Gurhwal. Traces of it indeed remained in the time of Tacitus among the Germans (Tac., *Germ.*, xx., Latham's ed. 67 and *seq.*). In short, P. is by many writers considered as one of the transitional forms in the advance from a primitive state of promiscuity; but the assumption that pure promiscuity ever had a widely established and enduring existence is undeniably dubious. The origin of this peculiar institution seems connected with the want of balance between the numbers of the sexes, due to the practice of female infanticide, which is its almost invariable accompaniment. Tribes of warriors, wholly devoted to military life, find women an incumbrance rather than a solace; and from this cause, and probably from the difficulties of subsistence, formed the practice of killing their female children, sparing them only when they were the first-born. The disparity of the sexes would lead to P., and once instituted, the custom would in many cases continue to exist after the habits and necessities which produced it disappeared. In several places, as in Ladak, where P. prevails, the sexes are now either equally balanced, or the female sex predominates. In these cases, polygynia and polyandry are commonly found existing side by side. The subject is one which demands and as yet has not received full investigation.

POLYANTHES, n. *pŏl'ĭ-ăn'thēz* [Gr. *polus*, many; *anthos*, a flower]: a genus of showy garden flowers, ord. *Liliācĕæ*. POLYANTHES TUBEROSA, *tūb'ĕr-ōz'ă* [L. *tūbĕrōsus*, having fleshy knots—from *tūber*, a protuberance]: the Tuberose (q.v.), prized for its fragrance and beauty.

Polyanthus.

POLYANTHUS, n. *pŏl'ĭ-ăn'thŭs* [Gr. *polus*, many; *anthos*, a flower]: kind of Primrose (q.v.), much prized and cultivated by florists. It is generally believed to be a variety of the Common Primrose (*Primula vulgaris*), produced by cultivation, in which an umbel of numerous flowers is supported on a common *scape* (leafless flower-

stem), instead of each flower rising on its own stalk from the crown of the root; a modification to which a tendency appears often in the wild plant itself. Thus, in its habit it somewhat resembles the cowslip and oxslip, while in the size of its flowers it is more like the common primrose; but instead of the pale uniformity of the wild plant, it exhibits great variety of delicate and beautiful colors. The sub-varieties are innumerable, new ones being continually produced from seed, and of short duration. The seed is sown about midsummer, and flowers may be expected in abundance next year, if the young plants are properly planted out. A rich free soil is most suitable. The polyanthus more than its congener, the auricula, loves shade and moisture. It is very hardy, and seldom suffers from the most severe winters. Fine kinds are preserved for a time by dividing the root. The cultivation of the Polyanthus is assiduous and successful in England.

POLYAN'THUS NARCIS'SUS. See NARCISSUS.

POLYARCHY, n. *pŏl'ĭ-ârʹkĭ* [Gr. *polus*, many, and *archē*, government]: the government by many—opposed to *monarchy;* also POLYGARCHY. POLYATOM'IC, a. *-a-tŏmʹ-ĭk*, in *chem.*, term applied to elements which contain more than one atom in their molecules.

POLYATOM'IC AL'COHOLS. See POLYHYDRIC ALCOHOLS.

POLYBA'SIC ACIDS: acids which require two or more equivalents of a base for neutralization. Most of the inorganic acids combine with bases in such a manner that one atom of the acid is united with one atom of a metallic oxide to form a neutral salt. Nitric acid may be taken as an illustration of the acids possessing this property, and which may therefore be called *monobasic.* In other cases, e.g., sulphuric acid, one atom of acid possesses the property of combining with two atoms of base; such acids are termed *bibasic* or *dibasic.* Common phosphoric and arsenic acids are examples of a third class of acids in which one atom combines with three atoms of base, and which are therefore termed *tribasic.* No polybasic acid is known beyond tribasic.

Among the organic acids a similar relation takes place, acetic, succinic, and citric acids affording examples of the monobasic, dibasic, and tribasic class.

The following are the most important general differences shown by acids of different degrees of basicity:

1. Each *monobasic* acid can form but *one* ether, which is neutral. 2. A *Monobasic* acid cannot form a stable, well defined acid salt, or a salt with two or more metallic bases.

1. Each *dibasic* acid can form *two* ethers, one neutral, and the other acid. 2. *Dibasic* acids can form with each metallic base a neutral salt and an acid salt. They can form also double salts containing two metallic bases.

1. Each *tribasic* acid can form *three* ethers, one neutral, and two acid. 2. *Tribasic* acids can form *three* salts with the same metallic base, two of them acid, and one neutral.

POLYBASITE, n.*pŏl'ĭ-bā'sīt* [Gr. *polus*, many; *basis*, a base]: a black, metallic mineral, occurring in hexagonal, tabular crystals of orthorombic symmetry. It is a sulph-antimonite of silver and copper, containing 75.6 per cent of silver, of which it is, therefore, an important ore. It occurs in many silver mines of Saxony, Mexico and the western United States.

POLYBIUS, *pō-lĭb'ĭ-ŭs:* Greek historian: about B.C. 210–128; b. Megalopolis, a town of Arcadia. From Lycortas, his father, who was among the leading men of the Achæan League, he received valuable instruction in the science of politics and the art of war. In 181 he would have visited Egypt in the capacity of ambassador, but the project of sending an embassy to that country was given up. He was one of the 1,000 noble and influential Achæans, who, after the conquest of Macedonia 168, were sent to Rome on the summons of the commissioners from that city to answer the charge of having failed to assist the Romans against King Perseus. On their arrival in Italy 167, they were not put upon their trial, but were distributed among the towns of Etruria. Owing, perhaps, to his having formed the friendship of Æmilius Paulus, or of his sons Fabius and Scipio, he was more fortunately allocated than others of his countrymen. His residence was fixed at Rome and in the house of Paulus. Scipio, then about 18 years of age, became strongly attached to Paulus, made him his companion in all his military expeditions, and profited greatly by his knowledge and experience. Paulus, in his turn, derived much advantage from the protection and friendship of Scipio, who gave him access to public documents, and aided him in the collection of materials for his great historical work. In 151 the surviving Archæan exiles were given permission to return to Greece. He soon, however, rejoined Scipio, followed him in his African campaign, and was present at the destruction of Carthage 146. But the outbreak of war between the Achæans and Romans summoned him again to Greece, where he arrived soon after the taking of Corinth. All his influence was exerted to procure from the conquerors favorable terms for the vanquished; and his countrymen were exceedingly grateful for his services in their behalf. It must have been about this time that Paulus undertook the writing of his great historical work, the materials of which he had long been collecting. It is not known at what period of his life he visited in foreign countries the places which he had to describe in his history. We know from himself that he undertook long and laborious journeys into Africa, Spain, Gaul, and even as far as the shores of the Atlantic, to add to the

scanty knowledge regarding these regions. These journeys were probably while accompanying Scipio. In the latter period of his life, he travelled in Egypt; and about 12 years before his death he probably accompanied Scipio to Spain, where he witnessed the fall of Numantia. He died in his 82d year, in consequence of a fall from his horse.

As a historian, P. occupies high rank. His work, beginning where that of Aratus breaks off, includes the period B.C. 220–146, i.e., to the year when Corinth fell, and, with it, the independence of Greece. Of the two parts into which it was divided, the first embraced 53 years, beginning with the second Punic war and the social war in Greece, and ending with the subjugation of the kingdom of Macedonia 168. This, the chief portion of his history, was designed to show how, in the short space of 53 years, the greater part of the world had been conquered by the Romans; and in order that his countrymen might have better knowledge of the rise of that people, he gives a sketch of the history of Rome from its capture by the Gauls to the outbreak of the second Punic war. This occupies the first two books, and may be regarded as an introduction to the work. The second part embraces the period from the fall of the Macedonian kingdom, 168, to the taking of Corinth 146. This part is supplementary to the first, and seems to have brought down the history of the conquest of Greece to its completion in the 39th book, while the 40th and last probably contained a chronological summary of the entire work. The style of P. is not to be praised, and he incurred the censure of later Greek critics for negligence in choice of words and in structure of sentences. His tone is too didactic in general; he abounds in moral reflections and loses no opportunity for preaching; and though his readers are prepared for this by his calling his work not a *Historia*, but a *Pragmateia*, still the continuity of the narrative is too often interrupted by digressions, often of little interest or value, and at best fatal to unity of impression and artistic effect. His praiseworthy aim at thoroughness and comprehensiveness, and to show the entire political situation at each important occasion, leads to wearisome and confusing digressions. His great merits are the conscientious care with which he collected his materials, his critical insight and breadth of view, his strong love of truth, and his sound judgment, which was materially assisted by his familiarity with political and military life. Much the greater part of his work has perished. Of the 40 books we possess only five entire; and of the rest, merely fragments or extracts. Some of these latter, however—such as the account of the Roman army—are of considerable length and value, and four separate collections of them have been added from time to time to the remains of the work. The first of these, discovered soon after the revival of learning, in a MS. of Corfu, gives us the greater part of the 6th book, and portions of the remaining 11. The second consists of extracts made in the 10th c., entitled *Excerpta de Legationibus*, and published at Antwerp by Ursinus 1582. The third, *Excerpta de Virtutibus et Vitiis*, was published by

Valesius 1634. The fourth, *Excerpta de Sententiis*, was discovered by Cardinal Mai in the Vatican, and published by him, Rome 1827. The history of P. was very closely followed by Livy after the period of the second Punic war, and by Cicero in his account of the Roman constitution in his treatise *De Republicâ*.—The best annotated edition of P. is Schweighäuser's (Leip. 1789). The best editions of the text, including that of the Vatican fragments, are those of Bekker (Berl. 1844) and L. Dindorf (1866).

POLYCARP, *pŏl'ĭ-kârp:* bishop of Smyrna, and one of the most illustrious of the early Christian martyrs; b. sometime before A.D. 69; d. prob. 155, Feb. 23. (The date of death has until recently been assigned to 166, in accordance with the *Chronicle* of Eusebius.) The place of his birth is not known. He was, however (according to a legendary fragment ascribed to an unknown Pionius), brought up at Smyrna, where his pupil, Irenæus, states that P. was taught the doctrines of Christianity by the apostles, particularly by John, with whom he had 'familiar intercourse.' The testimony of Irenæus on this point is of immense value, as it furnishes the chief historical link uniting the apostolic age—that age which is reflected in the later parts of the New Testament—with the rising church of the 2d c. The passage occurs in an expostulatory epistle to a Roman heretic, Florinus, and is preserved by Eusebius (*Hist. Eccl.* xx.). 'I can tell also the very place where the blessed Polycarp was accustomed to sit and discourse; and also his entrances, his walks, the complexion of his life, and the form of his body, and his conversations with the people, and his familiar intercourse with John, as he was accustomed to tell, as also his familiarity with those that had seen the Lord. Also concerning his miracles, his doctrine, all these were told by Polycarp, in consistency with the Holy Scriptures, as he had received them from the eye-witnesses of the doctrine of salvation.' The fragment of Pionius (above referred to) informs us that P., when a little child, was adopted by a rich Christian lady, Callisto, who left him heir to all her wealth, enabling him to gratify his love of beneficence and charity. We are utterly without means of verifying this narrative of Pionius; it is certain only that in some way P. had distinguished himself at a comparatively early period, for before the death of the apostle John (i.e., at the latest, before 104), P. was ordained bishop of the church at Smyrna (according to Tertullian and Jerome) by John himself; according to Irenæus, by 'the apostles;' and according to Pionius, by 'the bishops of the neighboring churches'—statements quite reconcilable with each other. P. was in the exercise of his pastoral office when Ignatius (q.v.) of Antioch passed through Smyrna on his road to Rome (107–116); and we are told that these two pupils of the apostle John, who had probably known one another in earlier years, had much delightful Christian converse. Almost half a c. afterward, P. himself visited Rome, when Anicetus was bp. there (157–168), and had a friendly conference with his brother on the subject of the proper time to hold

Easter. They could not agree—but they agreed to differ. His martyrdom, which is related at great length and in a touching manner by Eusebius (*Hist. Eccl.* xiv.), took place during the persecution under Emperors Marcus Aurelius and Lucius Verus. When asked, or rather entreated, 'to revile Christ' by the proconsul Statius Quadratus, who, being deeply impressed with the venerable appearance of the aged bishop, wished if possible to save his life, P. replied: 'Eighty-and-six years have I served Him, and He never did me wrong; and how can I now blaspheme my King that has saved me?' P. was burned alive. In such profound reverence was he held by his fellow-Christians, for his almost perfect graces of character, that the Jews (who had been conspicuously zealous in collecting 'wood and straw from the shops and baths' to burn him) instigated the proconsul not to give up the corpse of the martyr to his co-religionists, 'lest, abandoning him that was crucified, they should begin to worship this one.' More convincing evidence of a saintly character has never been adduced.

P. wrote several *Epistolæ*, of which only one has been preserved, *Epistola ad Philippenses*, valuable for its numerous quotations from the New Test.—especially from the writings of Paul and Peter. There has been some doubt whether this epistle is really by P.; but this doubt is lessening. In the most recent edition of the Apostolic Fathers (*Patrum Apostolicorum Opera*, Leipzig 1877), Prof. Zahn defends its genuineness. There are English versions by Cave, Clementson, and Wake.

POLYCARPOUS, a. *pŏl'ĭ-kâr'pŭs*, or POL'YCAR'PIC, a. *-pĭk* [Gr. *polus*, many; *karpos*, fruit]: in *bot.*, having the carpels distinct and numerous, each flower bearing several fruits—applied to plants which flower and fruit many times in the course of their life.

POLYCEPHALOUS, a. *pŏl'ĭ-sĕf'ă-lŭs* [Gr. *polus*, many; *keph'ălē*, the head]: in *bot.*, having a common support, capped by many like parts.

POLYCHORD, n. *pŏl'ĭ-kawrd* [Gr. *polus*, many; *chordē*, a string or chord]: an instrument having many strings; an apparatus which couples two octave notes.

POLYCHROITE, n. *pŏl'ĭ-krō'ĭt* [Gr. *poluchrŏos*, variegated—from *polus*, many; *chrŏa*, color]: the coloring matter of saffron, which exhibits a variety of colors when acted upon by various reagents.

POLYCHROME, n. *pŏl'ĭ-krōm* [Gr. *polus*, many; *chrōma*, color]: a peculiar substance obtained from the bark of the horse-chestnut, and in quassia-wood, which gives to water the quality of exhibiting a curious play of colors when acted upon by reflected light: ADJ. executed in the manner of polychromy. POLYCHROMATIC, a. *pŏl'ĭ-krō-măt'ĭk*, yielding many colors; exhibiting a play of colors—applied to an acid resulting from the action of nitric acid upon aloes. POL'YCHROMY, n. *-mĭ*, the art of coloring statuary to imitate nature; the art of heightening the effect of architectural decorations by the application of colors.

POLYCHROMY.

POL'YCHROMY, literally the use of many colors and generally used in the sense of decorative work by means of brilliant coloring or that which is brilliant in comparison with other work of the same class and character. Thus a fitting together of building-stones in patterns is polychromy, although the hues of the sandstone or limestone or marble are not positive nor strongly contrasted with one another. In French Romanesque architecture, as also in modern imitations of it, like Trinity Church, Boston, Mass., the sandstones are of two or three different shades of reddish brown, and an additional hue approaching buff; and yet this very moderate degree of contrast, when used deliberately in pattern, is called polychromy. On the other hand, polychromatic painting is always assumed to be in primary colors, or those which nearly approach them in brilliancy. Thus the painting of a Grecian Doric temple in the 5th century A.D. is known to have been in great measure carried out in the unmixed natural pigments as strong and pure as they could be procured; red and deep blue, with a free use of metallic gold in the form of gilt, bronze or the like, and the rather frequent introduction of such secondary colors as green and purple.

Color effects in architecture are as ancient as architecture itself. It never seems to have occurred to an Egyptian builder to leave his limestone walls unadorned with polychromatic effects, nor to the sculptor engaged in carving reliefs on those walls or statues to set up against them, that such human and animal forms could ever be left in the natural color of the stone. Sculpture was always completed by the paint-brush except in those cases where, chiefly for display or in the spirit of sacrifice, there was used a very costly and very hard material of some importance in its own surface and color. Thus an Egyptian statue of diorite or basalt, or a Roman statue of the imperial epoch wrought in black marble, or a portrait bust with the head and neck of white marble inserted into the draped shoulders and torso wrought in the most precious Oriental alabaster or beautiful veined marble from Greece or Numidia, would not be painted; and any polychromy that would be added by hand would be in the nature of gilding applied to the hair or the ornaments. So the bronze statue, highly esteemed for its material, which was always accepted as superior to marble or other natural stone, would receive eyes of hard natural stone or of glass, and perhaps gilding as mentioned above, but nothing more. On the other hand, some modern work in experimental polychromy has been carried farther; thus the statues and busts of Charles Henri Cordier have been adorned with enamel applied freely to articles of costume, to the harp of an Egyptian harp-player, in addition to the approximation of the natural color of skin and of drapery. In the Paris Exposition of 1900 there were exquisite statuettes wrought

in the precious materials, onyx, agate, alabaster and the like, with bronze of many colors or in other cases in carved and stained ivory. The most impressive piece of work of this kind was the statue by Ernest Barrias, *Nature Unveiling Herself*, a statue somewhat larger than life, of which the whole lower part representing the body from the breast downward with its drapery, is wrought of a single block of marble of unusual beauty—a superb piece of red and purple veining—while the breast and shoulders, arms and head, are in white marble, the hair and eyes being stained, and the veil is of a natural stone of a delicate buff or perhaps greenish yellow tinge.

Polychromy in painting has not been so commonly used in modern times. For some reason painting, when applied in merely flat and unchanging masses, is looked on with some contempt by modern decorators; and the artist who controls a more complete skill, whose painted work is characterized by all the art of gradation and harmony known to the modern world abstains from doing such purely decorative work. It was not so in antiquity, for while no fragment remains to us of the highest development of chromatic effect in sculpture, on the other hand there were no texts more intelligible than those which set forth the practice of employing painters of name and fame to adorn with color the works of the sculptors. An early but most interesting example of what this work must have been is seen in the draped statues discovered on the Acropolis in 1883 and 1886. The color is disappearing rapidly; but when it was taken from the ground it was brilliant. The outer garment (himation or peplos) has in every case a rich border of two or three contrasting hues; the larger surfaces of the stuff are shown, as covered with a pattern in spots or small foliated figures; and the under garment (chiton), where visible, is often painted in a strong, deep green, which was probably in the first place more nearly blue. Hair, eyes, lips, and all the jewelry shown, such as earrings, are treated separately and with what seems to have been a free use of gilding.

The great masters of polychromy are, however, the Persians and the civilized races of Asia generally. Beauty of pattern is especially the Persian gift; but this merit is shared by the people of the Indian Peninsula and by the Chinese and the Japanese, and in a lesser degree by the Malays and the inhabitants of Farther India. Even the peoples of very low civilization in the north, the original inhabitants of Siberia, showed a marked gift in the arranging of decorative patterns. Both the Japanese and Chinese use polychromy in their larger works, temples and the like, with great freedom and with perfect success; the Japanese limiting brilliant effects rather to the interior and to special details of the exterior, while the Chinese had at one time the great art of polychromatic building, using their enameled potteries with perfect freedom.

POLYCLITUS, *pŏl-ĭ-klī'tŭs*, OF SICYON: Greek sculptor and architect. He was a pupil of the Argive sculptor Ageladas, in whose studio he became fellow student of Phidias. He flourished 452–412 B.C. He stood at the head of the schools of Argos and Sicyon, and is held to rival Phidias, the head of the Athenian school. The latter was considered preëminent for his statues of the gods, and Polyclitus in those of men. He excelled particularly in representing the graceful attitudes of youthful athletes. One of his most celebrated statues was the Doryphorus (Spearbearer), a figure to which the name of canon, or standard of beauty, was given, as in it the artist had produced a perfect ideal of the human form. His statue of Hera, in the temple between Argos and Mycenæ, was thought by Strabo to be equal to Phidias' chryselephantine statues of Zeus and of Athena. The goddess was represented enthroned, wearing a garland on which were wrought the Graces and Hours; in one hand she held a pomegranate, and in the other a sceptre surmounted by a cuckoo. The head, breast, arms, and feet were of ivory, and the robe of gold. As an architect Polyclitus won special fame from the theatre and rotunda, which he designed for Epidaurus, which Pausanias pronounced to be the finest buildings of their kind ever erected. Polyclitus also wrote a treatise on the proportions of the human form.

POLYCOTYLEDON, n. *pŏl'ĭ-kŏt'ĭ-lē'dŏn* [Gr. *polus*, many; *kotulē'dōn*, a hollow vessel—from *kotulē*, a cup]: in *bot.* a plant of which the embryos have more than two seed-leaves or cotyledons. POL'YCOTYLE'DONOUS, a. *-lē'dŏ-nŭs*, term applied to plants having more than two lobes to the seed (see COTYLEDON; DICOTYLEDONOUS). In some of the *Coniferæ* in particular, there are numerous cotyledons; the genus *Pinus* has from 3 to 12. These cotyledons are placed in a whorl, and have the gemmule of the embryo in the midst of them. Polycotyledonous plants do not form a separate division of the vegetable kingdom, but are ranked with dicotyledonous plants; for plants with two, and plants with more cotyledons, are found not only in the same nat. order, but in the same genus. POL'YCOTYLE'DONY, n. *-nĭ*, an accidental increase in the number of cotyledons.

POLYCRACY, n. *pŏ-lĭk'ră-sĭ* [Gr. *polus*, many; *kratos*, power, strength]: government by many rulers.

POLYCRATES, *pŏ-lĭk'ra-tēz:* famous Greek 'tyrant' of Samos; son of Æaces; b. in the first part of B.C. 6th c.; but nothing is known of him until the time when, with the assistance of his brothers Pantagnotus and Syloson, he obtained possession of the island B.C. 537 or 536. The three brothers at first ruled conjointly; but after a short time Polycrates put Pantagnotus to death, banished Syloson, and made himself sole despot. His energetic, unscrupulous, and ambitious character then showed itself

more conspicuously. He conquered several islands of the Archipelago, and even some towns on the Asiatic mainland, waged war successfully against the inhabitants of Miletus, and defeated their allies, the Lesbians, in a great sea-fight. His fleet amounted to 100 ships, and was probably at that time the most powerful in all Greece. Polycrates seems to have aspired to the sovereignty of the Ægean, if not also of the cities of Ionia. His intimate alliance with Amasis, King of Egypt, proves the importance in which this daring island-prince was held even by great monarchs. The particular incident that is said to have finally ruptured the alliance is well known. Amasis is reported to have written a letter to Polycrates, earnestly advising him to throw away the possession that he deemed most valuable, and thereby avert the stroke of the spleenful gods. Polycrates, in compliance with this friendly advice, cast an emerald signet-ring of marvellously beautiful workmanship into the sea; but the next day a fisherman presented the 'tyrant' with an unusually big fish that he had caught, and in its belly was found the identical ring. It was quite clear to Amasis now that Polycrates was a doomed man, and he immediately broke off the alliance. So, at least, Herodotus tells the story, but Grote (*History of Greece*, IV. 323) suggests—and the suggestion is far more probable—that Polycrates, with characteristic perfidity, abandoned the Egyptian for a Persian alliance, when he found the latter likely to be of more value to him in his ambitious designs. When Cambyses invaded Egypt B.C. 525, Polycrates sent him a contingent of 40 ships, in which he placed all the Samians disaffected toward his 'tyranny,' and told the Persian king privately not to let them come back. However, they escaped in some way, returned to Samos, and made war against the 'tyrant,' but without success. Hereupon, they went to Sparta, and succeeded in enlisting the sympathies, or, at any rate, in securing the help of both the Spartans and Corinthians. A triple force of Samians, Spartans, and Corinthians embarked for Samos, and attacked the city. After vainly besieging it 40 days, they sailed away, and Polycrates became more powerful than ever; but Nemesis had her victim after all. A certain Orœtes, the Persian satrap of Sardis, had, for unknown reasons, conceived a deadly hatred against Polycrates, and having enticed the latter to visit him, by appealing to his cupidity, he seized and crucified him.

POLYCYSTINA, n. plu. *pŏl'ĭ-sĭs'tĭn-ă*, or POLYCYSTINES, n. plu. *pŏl'ĭ-s-s'tinz* [Gr. *polus*, many; *kustis*, the bladder]: an order of the Protozoa having foraminated siliceous shells. POLYCYSTIC, a. *pŏl'ĭ-sĭs'tĭk*, having many cells or small cavities; multilocular.

POLYDIPSIA, n. *pŏl'ĭ-dĭp'sĭ-ă* [Gr. *polus*, many; *dipsa*, thirst]: medical term for excessive thirst: now commonly applied to the disease formerly known as *Diabetes insipidus* (q.v.).

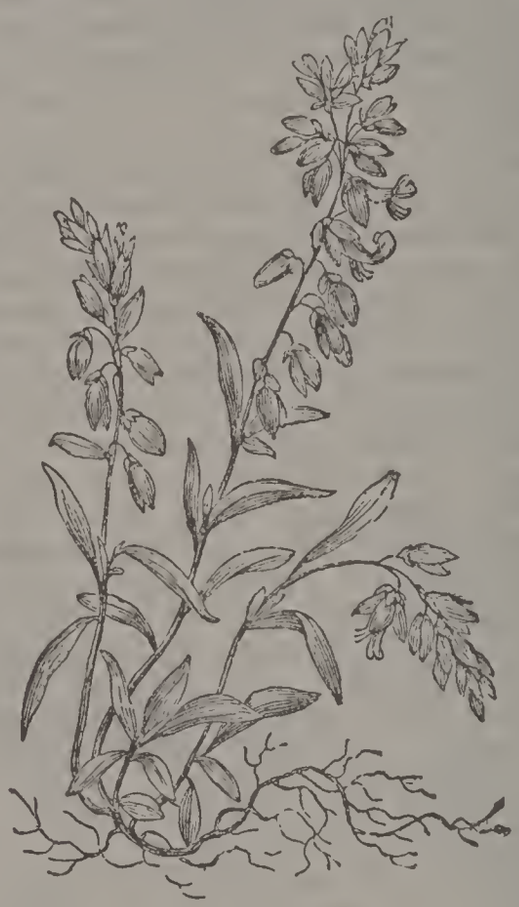
POLYEMBRYONY, n. *pŏl'ĭ-ĕm-brī'ō-nĭ* [Gr. *polus*, many; *em'bruon*, an embryo]: in *bot.*, the existence or development of two or more embryos in the same seed. Pol'yembryon'ic, a. *-brĭ-ŏn'ĭk*, having more than one embryo.

POLYFOIL, n. *pŏl'ĭ-foyl* [Gr. *polus*, many, and Eng. *foil*]: in *arch.*, an ornament formed by a molding disposed in a number of segments of circles.

POLYGALA, n. *pŏl-ĭg'ă-lă* [Gr. *polus*, much; *găla*, milk]: extensive genus of plants, all the species of which are showy; type of the order Polygaleæ (q.v.). P. Senega, *sĕn'ĕ-gă* [of or from *Senegal*]: the senega or snake root (see Senega). Polygalic acid, *pŏl-ĭg'ă-lĭk*, an acrid principle obtained from it.

POLYGALEÆ, *pŏl-ĭ-gā'lē-ē*, or Polygalaceæ, *pŏl-ĭ-gā-lā'sē-ē:* natural order of exogenous plants, herbaceous or shrubby, sometimes twining; the leaves without stipules, and generally simple; the flowers resembling papilionaceous flowers, but the odd petal inferior, and the odd sepal superior; the flower-stalks with three bracts; the calyx of five very irregular sepals; of which the two interior are usually petal-like; the corolla of three or sometimes five petals, the anterior petal the largest, and often crested; stamens eight, monadelphous or diadelphous, or four and distinct; the ovary superior, generally 2-celled, one ovule in each cell style and stigma simple; fruit generally a capsule opening by valves, sometimes a drupe. There are about 500 species, diffused through all parts of the world.—The genus *Polygala* has a persistent calyx, eight stamens, the lateral sepals large and petal-like, and hairy or wrinkled seeds. The species are very numerous, annual and perennial herbaceous plants, and small shrubs, natives chiefly of warm and temperate climates. There are 15 or more species in the United States, several with yellow flowers (s. species), the rest purple, white, or greenish; the best known are the Seneca Snake Root, and the so-called Flowering Wintergreen (*P. paucifolia*), better named the Fringed P. The Common Milkwort of Britain (*P. vulgaris*) is a small perennial plant, growing in dry hilly pastures; with an ascending stem, linear-lanceolate leaves, and a terminal raceme of small but very beautiful flowers, having a finely crested keel. It varies considerably in size, in the size and even shape of the leaves, and in the size and color of the flowers, which are sometimes of a most brilliant blue, sometimes purple, pink, or white.—Several species are natives of s. Europe.—The Cape of Good Hope and other sub-tropical countries produce many beautiful species, some of which have become common ornaments of greenhouses.—*P. Senega* is a N. American species, with erect simple tufted stems, about 12 inches high, and terminal racemes of small white flowers. The root woody, branched, contorted, and about half an inch in diameter, is the Senega Root, Seneka Root, or Snake Root of the United States (see Senega), famous as an imaginary cure for snake-bites, but really possessing im-

portant medicinal virtues—stimulating, diuretic, diaphoretic, emmenagogue, and in large doses emetic and purgatives—employed in catarrhs, pulmonary affections, rheumatisms, low fevers, etc. Its chief active principle is Polygalin, Senegin, or Saponin, $C_{18}H_{24}O_{10}$. The root of *P. Senega* has been employed as a cure for snake-bites by the American Indians from time immemorial, and it is noticeable that *P. crotalarioides* is employed in the same way in the Himalaya. *P. vulgaris* is tonic, stimulant, and diaphoretic; and *P. amara* a very similar European species, pos-



Common Milkwort (*Polygala vulgaris*).

sesses the same properties in a higher degree, as does *P. rubella*, a small N. American species. The root of *P. poaya*, a Brazilian species, with leathery leaves, is an active emetic, and in a fresh state is employed in bilious fevers. Similar properties seem to pervade the whole genus. Another medicinal plant of the order is *Rhatany* (q.v.) *root*. Species of several genera are used as tonics. The bark of the roots of *Monnina polystachia* and *M. salicifolia* is used in Peru as substitute for soap. *Mundia spinosa*, a s. African shrub, produces an eatable fruit.

POLYGAMIAN, a. *pŏl'ĭ-gā'mĭ-ăn*, or POLYGAMOUS, a. *pŏl-ĭg'ă-mŭs* [Gr. *polus*, many; *gamos*, a marriage]: in *bot.*, pertaining to plants of the class POL'YGA'MIA, *-mĭ-ă*, which bear three descriptions of flowers—hermaphrodite, male, and female.

POLYGAMY, n. *pŏl-ĭg′ă-mĭ* [see POLYGAMIAN]: the practice or state of having several wives at the same time (see MARRIAGE). POLYG′AMOUS, a. *-mŭs*, having more than one wife at the same time; mating with several females; inclined to polygamy. In *botany*, term applied to plants which produce both unisexual and hermaphrodite flowers either on the same or different plants. In the Linnæan sexual system, these plants formed a class, POLYGAMIA, the genera included in which were perhaps more completely disjoined from their natural allies than those of any other class of that system, forming by themselves a very heterogeneous assemblage. POLYG′AMIST, n. *-mĭst*, one who practices, or maintains the lawfulness of, polygamy.—See BIGAMY: MORMONS.

POLYGARCHY, n. *pŏl′ĭ-gâr′kĭ* [Gr. *polus*, many; *archē*, rule]: government by many; also POLYARCHY.

POLYGASTRIC, a. *pŏl′ĭ-găs′trĭk* [Gr. *polus*, many; *gastēr*, the belly]: having many stomachs; applied to the minute and simple infusoria, formerly called POL′YGAS′TRICA (see INFUSORIA).

POLYGENISM, n. *pŏl-ĭj′ĕn-ĭzm*, or POLYG′ENY, n. *-ĕn-ĭ* [Gr. *polus*, many; *genos*, kind, race]: the theory which teaches that God created man in different grades, both in savagery and civilization. POLYG′ENIST, n. *-ĕn-ĭst*, one who believes in the creation of man in different grades. POLYGENOUS, a. *pŏl-ĭj′ĕn-ŭs*, consisting of many kinds.

POLYGLOT, a. *pŏl′ĭ-glŏt* [Gr. *polus*, many; *glōtta*, the tongue]: having or containing many languages: N. in general, an assemblage of versions in different languages of the same work; but used almost exclusively to denote a version of the Bible in several languages. The Hexapla (q.v.) of Origen contained, besides the Hebrew text, several other versions. All these, however, were in the Greek language; and the Hexapla is not commonly reckoned among the polyglots. The polyglots are divided into two classes, the greater and the less. To the former belong four works, known as the Complutensian P.; the Antwerp or king of Spain's P.; the Parisian P.; and the London or Walton's P.—The Complutensian P. derives its title from Complutum, Latin name of Alcala de Henares, where it was printed in 6 vols. folio, 1502–17, being published at the cost, and under the direction of the famous Cardinal Ximenes, who spared no expense, whether in collecting the most ancient and authentic MSS., or in bringing together the most distinguished scholars of all countries for carrying out his design. It contains, besides the Hebrew text, the Septuagint Greek and the Chaldee (each with a literal Latin version), and the Latin Vulgate.—The Antwerp P., so called from its being there printed (8 vols. folio, 1569–72), at the renowned press of Plantin, was published at the cost of Philip II. of Spain, under direction of the distinguished scholar, Benedict Arias Montanus; and contains, in the Old Test., the Hebrew, the Greek, the Targum of Onkelos, and the other Chaldee paraphrases, and the Latin Vulgate: in the New Test., besides the Greek and Latin, it

contains a Syriac version, printed both in Syriac and in Hebrew characters. Arias Montanus was assisted by many scholars of eminence, chiefly of Spain and the Low Countries.—The Parisian Polyglot was printed in ten splendid vols. (Paris 1645) at the cost and under the editorship of Guy Michel le Jay; and contains, in addition to the contents of the Antwerp P., another Syriac version, and an Arabic version, together with the Samaritan version and the Samaritan text of the Pentateuch, each accompanied by a literal Latin translation.—The London P. (6 vols. folio, 1654–57) was edited by Brian Walton, afterward bp. of Chester, and it engaged for many years a number of the most eminent linguists of the period. The number of its languages is not the same in all parts of the Bible, but it may be said to contain the Bible, or portions of it, in 9 languages—Hebrew, Samaritan, Chaldee, Syriac, Arabic, Ethiopic, Persic, Greek (each of these accompanied by a literal Latin version), and Latin; and was followed 1669 by *Lexicon Heptaglotton* of Edmund Castell, 2 vols., folio, containing dictionaries of all the languages of the polyglot, except the Greek and Latin. Of the minor polyglots, the chief are (1) the Heidelberg P. (1586), Hebrew, Greek, and Latin; (2) Wolder's P. (Hamburg 1596), Hebrew, Greek, Latin, and German; (3) Hutter's P. (Nürnberg 1599), Hebrew, Chaldee, Greek, Latin, German, and French; (4) Reineccius's P. in Syriac, Greek, Latin, and German (Leipzig, New Test. 1712, Old Test. 1750–1); (5) Bagster's P., very valuable collection of modern versions, folio (London 1831), containing eight versions, in the Old Test.—viz., Hebrew, Greek, English, Latin, French, Italian, Spanish, and German; and nine in the New Syriac being added to the foregoing; (6) a useful 'Hand P.,' containing in the Old Test., Hebrew, Greek, Latin, Vulgate, and Luther's German version; and in the New Test., Greek, Latin, Luther's German, and in the fourth column presenting the chief differences between this and other German versions.

Besides the Bible, many other works, or small pieces, have been published in P. Of smaller pieces, the Lord's Prayer has been the favorite, of which many collections, containing a greater or less number of languages, have been published since the 16th c. Of these, the most comprehensive, and, for philological purposes, far the most valuable, is the well-known *Mithridates* of Adelung, which contains the Lord's Prayer in nearly 500 languages, with vocabularies and grammatical explanations of most of the specimens.

POLYGNOTUS.

POLYGNOTUS, *pŏl-ĭg-nō'tŭs:* distinguished Greek painter of antiquity; born in the Isle of Thasos, near the beginning of B.C. 5 c; d. about B.C. 426; of a family of painters, who came to Athens to practice their profession probably after the subjugation of Thasos by Cimon. P. and his brother, Aristophon, were instructed in the principles of art by their father Aglaophon. We know almost nothing of their lives, except that P. was a friend of the Athenian general Cimon, and is said to have been attached to his sister, Elpinice. P. was a contemporary of the great sculptor Phidias (q.v.), and flourished during the supremacy both of Cimon and of Pericles; but we hear little or nothing of him under the latter ruler; and though he was the first painter of his day, it does not appear that he was engaged in the decoration of any of those splendid buildings with which that statesman adorned Athens. It is not at all unlikely that Pericles was averse to patronizing a friend of Cimon, and, at all events, P. was absent from Athens 14 years (B.C. 449–435) of Pericles's rule, painting at Delphi and elsewhere. His principal works (following a chronological arrangement as far as it can be ascertained) were: 1. Paintings in the Temple of Theseus at Athens. 2. In the Stoa Poecile (or Painted Portico) at Athens, representing the Greek princes after the taking of Troy, assembled to judge of the violation of Cassandra by Ajax. 3. In the Anakeion, or Temple of the Dioscuri, a painting of the marriage of the daughters of Leukippos. 4. In the Temple of Athena Areia at Platæa, a picture of Ulysses after having slain the suitors of Penelope. 5 In the Leschê (or 'Conversazione Saloon'), a famous quadrangular court, or peristyle, surrounded by colonnades, built at Delphi by the Cnidians. The walls of this edifice were covered by P. with a series of paintings representing the wars of Troy, and the return of the Greek chiefs, and considered P.'s masterpiece. 6. In the chamber adjoining the Propylæa of the Acropolis. From the criticism of the ancients, it appears that P. was a great advance on any of his predecessors in the art. He was the first who gave life, character, expression to painting. According to Pliny, he opened the mouth and showed the teeth of his figures; he was the first to paint women with transparent drapery, and with rich head-dresses. Lucian also speaks of his exquisite skill in painting eyebrows and the blush on the cheek; while Aristotle extols the ethical or ideal beauty of his conceptions, saying that P. 'represented men as better than they were,' and finding a parallel for his style in the epic poetry of Homer.

UNITED EDITORS' ENCYCLOPEDIA AND DICTIONARY.

POLYGON, n. *pŏl'ĭ-gŏn* [Gr. *polus*, many; *gōnĭa*, a corner or angle]: in Geometry: a figure bounded by straight lines. A *regular* polygon has equal sides and equal angles. The *perimeter* of a polygon is the sum of the lengths of its sides. In the case of a *plane* polygon the sum of the internal angles is got by multiplying two right angles by the number of sides less two. The area is found by dividing the polygon into triangles. Polygons are named according to their number of sides, or vertices, thus: triangle, quadrangle, pentagon (5 sides), hexagon (6 sides), decagon (10 sides), etc. Polygons of more than 12 sides do not usually receive single-worded names. *Similar polygons* are those which have their several angles equal each to each, and the sides about their equal angles proportionals. All similar polygons are to one another as the squares of their homologous sides. If the sides are all equal and the angles are likewise all equal, the polygon is regular; otherwise, it is irregular. The angle of a regular polygon of a given number of sides is a definite quantity depending only on that number. Every regular polygon can be circumscribed by a circle, or have a circle circumscribed in it. POLYGONAL, a. *pŏl-ĭg'ō-năl*, or POLYG'ONOUS, a. *-nŭs*, having many angles and sides. EXTERIOR POLYGON, in *fort.*, the figure formed by lines connecting the angles of the bastions with one another. INTERIOR POLYGON, the figure formed by the lines connecting the centres of the bastions. POLYGON OF FORCES, a diagram used in graphic statics, depending upon the following theorem: 'If any number of forces acting upon a point be represented in magnitude and direction by the sides of a polygon taken in order, they will be in equilibrium,' or 'any side of a polygon, taken in reverse order, will represent the magnitude and direction of the resultant of any number of forces acting upon a point, when these forces are represented in magnitude and direction by the remaining sides of the polygon taken in direct order.' POLYGONAL NUMBERS, the successive sums of any series of numbers in arithmetical progression.

POLYGONEÆ, *pŏl-ĭ-gō'nē-ē*, or POLYGONACEÆ, *pŏl-ĭ gō-nā'sē-ē*: natural order of exogenous plants, mostly herbaceous, but including a few shrubs, and even trees. The leaves are alternate, sometimes without stipules, but generally with stipules cohering around the stem. The flowers are frequently unisexual. They have an inferior, often colored perianth, generally in four, five, or six segments; three to nine stamens inserted into the bottom of the perianth; a one-celled ovary, usually formed of three carpels, but containing only one ovule; styles and stigmas as many as the carpels of the ovary; the fruit generally a nut, often triangular, the seed with farinaceous albumen, which has an economic importance in buckwheat. A few species produce a succulent edible fruit. The order contains nearly 500 known species, natives of almost all parts of the world, but abundant particularly in the temperate regions of the n. hemisphere. Many of the species are common weeds, as different species of Dock (q.v.) and *Polygonum*. Bistort (q.v.), Buckwheat (q.v.), and Sorrel (q.v.) belong to this order.—The genus *Polygonum* has a colored perianth of five segments, stamens in two rows, styles more or less united at the base, and two or more in number; the fruit invested by the persistent perianth. The species are very numerous. MILD WATER-PEPPER (*P. hydropiperoides*), with white or flesh-colored flowers, abounds in many wet places. JOINTWEED (*P. articulatum*), remarkable for its many-jointed racemes, is found on the coast and the Great Lakes. KNOT-GRASS, GOOSE-GRASS, or DOOR-WEED (*P. aviculare*), a very common weed, is one of the plants remarkable for most extensive distribution over the world. It is an annual of very humble growth, but very variable, with much branched trailing stems, small lanceolate leaves, and very small flowers, two or three togther, in the axils of the leaves. Thunberg says that in Japan a blue dye is prepared from this plant. *P. amphibium*, var. *aquaticum*, one of the species often called *Persicaria*, is abundant about margins of ponds and ditches and is remarkable for the difference between the leaves which float on the water, as is often the case, and those on stems growing erect—those of the former being broad and smooth, those of the latter narrow and rough; the spikes of flowers being also of somewhat different form, and the stamens in the flowers of the floating stems shorter than the perianth, in the upright stems about as long as the perianth; differences which might be held to indicate different species, yet both may be found growing from one root. The stems have been used on the continent of Europe as a substitute for sarsaparilla. Some other species are occasionally used for medicinal purposes. *P hydropiper*, often called COMMON SMARTWEED, or WATER PEPPER, a plant common by sides of lakes and ditches, is acrid enough to be used as a vesicant. Several species are occasionally used for dyeing, as the LADY'S THUMB (*P. persicaria*), a common weed, with a dark triangular or crescentic spot in the middle of the leaf; but the only species really important on this account is that called DYERS' BUCKWHEAT (*P. tinc*

torium), native of China, biennial, with ovate leaves and slender spikes of reddish flowers, the cultivation of which has been successfully introduced in France and Flanders. It yields a blue dye scarcely inferior to indigo.—*P. orientale*, PRINCE'S FEATHER, has long been occasionally cultivated in flower-gardens in some n. countries, and is quite hardy, though a native of the W. Indies.—*Fagopyrum cymosum*, species of buckwheat abundant on the mountains of n. India, affords an excellent substitute for spinach.—*Mühlenbeckia adpressa* is the Macquarie Harbor Vine of Tasmania, an evergreen climbing or trailing shrub of most rapid growth, sometimes 60 ft. long. It produces racemes of fruit somewhat resembling grapes or currants, the nut being invested with the large and fleshy segments of the calyx. The fruit is sweetish and subacid, and is used for tarts. *Coccoloba uvifera* is the SEASIDE GRAPE (q.v.) of the W. Indies. See also CALLIGONUM.

POLYGONOMETRY, n. *pŏl'ĭ-gŏn-ŏm'ĕ-trĭ* [Eng. *polygon*, and Gr. *metron*, a measure]: the doctrine of polygons.

POLYGRAM, n. *pŏl'ĭ-grăm* [Gr. *polus*, many; *grammē* a stroke in writing—from *graphō*, I write]: a figure consisting of many lines.

POLYGRAPH, n. *pŏl'ĭ-grăf* [Gr. *polus*, many; *graphō*, I write]: an instrument for producing several copies by one act of writing; a collection of the works of one or several authors. POL'YGRAPH'IC, a. *-grăf'ĭk*, or POL'YGRAPH'ICAL, a. *-ĭ kăl*, pertaining to a polygraph, or done by one. POLYGRAPHY, n. *pŏl-ĭg'ră-fĭ*, the art of writing in various ciphers; the art of interpreting or reading documents written in cipher.

POLYGYN, n. *pŏl'ĭ-jĭn* [Gr. *polus*, many; *gŭnē*, a woman]: in *bot.*, a plant having many pistils or many distinct styles. POLYGYNIAN, a. *pŏl'ĭ-jĭn'ĭ-ăn*, or POLYGYNOUS, a. *pŏl-ĭj'ĭ-nŭs*, having many styles or pistils, as the order of plants POL'YGYN'IA, *-jĭn'ĭ-ă*.

POLYGYNŒCIAL, a. *pŏl'ĭ-jĭn-ē'shĭ-ăl* [Gr. *polus*, many; *gŭnē*, a woman; *oikos*, a house]: in *bot.*, a term applied to multiple fruits formed by the united pistils of many flowers.

POLYGYNY, n. *pŏl-ĭg'ĭ-nĭ* [Gr. *polus*, many; *gŭnē*, a woman]: the practice of having more wives than one at the same time; polygamy. POLYG'YNIST, n. *-ĭ-nĭst*, one who has more than one wife at the same time. POLYG'YNOUS, a. *-ĭ nŭs*, pertaining to.

POLYHALITE, n. *pŏ lĭ'hă-līt* [Gr. *polus*, many; *hals*, salt—in allusion to the number of salts which enter into its composition]: a mineral occurring in compact fibrous masses, usually brick-red or flesh-colored.

POLYHEDRON, n. *pŏl'ĭ-hē'drŏn* [Gr. *polus*, many; *hĕdra*, a seat or base]: a solid body having many faces or sides; in *optics*, a multiplying glass or lens having several plane surfaces disposed in a convex form. POL'YHE'DRAL, a. *-drăl*, or POL'YHE'DROUS, a. *-drŭs*, having many sides or faces.

POLYHYDRIC AL'COHOLS, *pŏl-ĭ-hī'drĭk:* alcohols having more than one hydroxyl group. The term *Alcohol,* originally limited to one substance—viz., spirit of wine—is now applied to a number of organic compounds, many of which, in their external characters, bear little resemblance to common alcohol. They all, however, are analogously constituted, having the composition of hydrocarbons in which one or more of the hydrogen atoms are replaced by hydroxyl, OH. They may therefore be regarded as compounds of hydroxyl with univalent or multivalent hydrocarbon radicals, hence called alcohol radicals. Thus from propane C_3H_8, are derived the 3 alcohols:

$C_3H_7(OH)$	$C_3H_6(OH)_2$	$C_3H_5(OH)_3$
Propyl alcohol.	Propylene alcohol.	Propenyl alcohol.

Hence alcohols are classed as monohydric, dihydric, trihydric, etc., or generally as monohydric and polyhydric, according to the number of hydroxyl groups that they contain.

POLYHYMNIA, *pŏl-ĭ-hĭm'nĭ-a,* or POLYMNIA, *pō-lĭm'-nĭ-a* ('the Many-hymned One'): one of the nine Muses (q.v.). She was reputed by the ancients as the inventor of the lyre, and as presiding over lyric poetry and eloquence. In works of art she is represented usually in a pensive attitude, with the forefinger of the right hand upon the mouth.

POLYKALITE, n. *pŏl'ĭ-kă-līt* [Gr. *polus,* many; and Eng. *alkali*]: a mineral composed of calcic, magnesic, and potassic sulphates, found in the salt-beds of Stassfurt.

POLYMATHY, n. *pŏl ĭm'ă-thĭ* [Gr. *polus,* many; *mathēsis,* learning—from *manthanō,* I learn]: the knowledge of many arts and sciences; varied knowledge. POLYMATHIC, a. *pŏl'ĭ-măth'ĭk,* pertaining to polymathy.

POLYMERISM, n. *pŏl-ĭm'ĕr-ĭsm* [Gr. *polus,* many; *meros,* a part]: in *chem.,* state of a body in which, while the relative proportions of the elements are the same, the absolute number of atoms of each element differs; a variety of Isomerism (q.v.). POLYMERIC, a. *pŏl'ĭ-mĕr'ĭk,* having the character of polymerism. POLYM'EROUS, a. *-ĕr-ŭs,* composed of many parts.

POLYMORPH, n. *pŏl'ĭ-mŏrf* [Gr. *polus,* many; *morphē,* a shape]: one of a numerous tribe or series of shells so irregular in form that they cannot be referred to any known genus. POL'YMOR'PHOUS, a. *-mŏr'fŭs,* having many forms; assuming many shapes. POLYMOR'PHY, n. *-mŏr'fĭ,* the existence of several forms of the same organ on a plant, as variously formed leaves.

POLYNE'MUS—POLYNE'MIDÆ: see MANGO FISH.

POLYNESIA, n. *pŏl-ĭ-nē'shĭ-a* [Gr. *polus*, many; *nēsos*, an island]: that which consists of many islands; term applied to groups of islands mostly tropical in the Pacific. POLYNE'SIAN, a. *-zhan* or *-shan*, pertaining to Polynesia.

POLYNESIA, *pŏl-ĭ-nē'shĭ-a:* name usually given, with more or less limitation, to the numerous groups of islands, and a few single islands, scattered throughout the great Pacific Ocean. In its widest signification the term P. might be understood as embracing, besides the groups hereafter to be mentioned, the Malay or Indian Archipelago, and Australia. Including these the whole region has sometimes been called Oceania; and in this wide sense the term Australasia (q.v.) is also used, though generally in a narrower range. It is, however, usual now to exclude from Polynesia the whole Malay Archipelago (q.v.) Australia (q.v.), Tasmania (q.v.), and New Zealand (q.v.); and to apply the term at most to the islands n. and s. of the equator, extending from Papua or New Guinea on the west to Easter Island, 2,400 m. from the S. Amer. coast. This is P. in the widest sense in which it is now customary to apply the word; and these islands and groups of islands are now usually subdivided (on ethnological and other grounds) into three distinct areas or series: (1) *Melanesia* [named from the *black* inhabitants; Gr. *melas*]; comprising Papua, the Admiralty Islands, the New Britain group, the Solomon Islands, the New Hebrides, and Santa Cruz groups, New Caledonia and the Loyalty Islands, and farthest e. the Fiji Islands. The Melanesian islands are mostly mountainous, fertile, with a warm, moist climate, and are occupied by people of the frizzly-haired Papuan race (see PAPUA), mixed in the w. with the Malay stock, and in the e. with the true Polynesian blood. Some of the islands are volcanic; many are surrounded by coral reefs. Ethnologically the large islands of Timor and Flores, in the Malay Archipelago, might be ranked in Melanesia, as being inhabited by a Papuan people. (2) *Micronesia* includes the islands [all small—Gr. *mikros*—whence the name] n. of the equator from 130° e. to 180° e.: the principal groups are Marshall Islands, Gilbert or Kingsmill Islands, the Caroline Islands, Pelew Islands, and the Ladrones or Mariana Islands. These also are partly volcanic or mountainous, partly low and coralline. The Marshall and Gilbert Islands all are low and flat. Most of these are inhabited by fair Polynesians, mingled in some places with Malay or negrito blood. (3) *Polynesia*, in the stricter sense, comprises the other groups of islands e. of Fiji: the principal are the Tonga or Friendly Islands, the Samoa or Navigator's Islands, Savage Island, the Ellice and Union Islands, Cook's or Hervey's Islands, the Society Islands (with Tahiti), the Austral Isles and Low Archipelago (Paumotu or Tuamotu, called also Pearl or Dangerous Islands), Pitcairn and Easter Islands, the Marquesas, Manihiki or Penrhyn, the America and Phœnix groups, and, farthest n., Hawaii, or the Sandwich Islands. These, whether volcanic or coral isles, are the home of the true or fair Polynesian race described below.

In all the three subdivisions are both high and low islands. The high volcanic or mountainous ones comprise most of the Melanesian islands; some of the Micronesian ones; and among the more strictly Polynesian islands, the Friendly group (Tahiti having a mountain 7,500 ft. high), the Marquesas, the Samoan group, and the Hawaiian, formerly Sandwich, Islands (Hawaii having volcanic craters from 11,000 to near 14,000 ft. high).

The Coral Islands (q.v.) may be distinguished into three classes—namely, atolls or lagoon islands, barrier reefs, and fringing reefs. The atolls are rings of coral reefs, inclosing a basin of sea-water of considerable depth. Examples of these are found in the Caroline Islands, the Dangerous Archipelago, and several other groups. Barrier reefs differ from the atolls chiefly in the fact of their containing an island in their centre, the island being separated from the reef by a body of deep water; while the reef is in some instances entirely converted into land, and in others the sea washes over it, except in certain portions, which project above the level of the ocean. Barrier reefs occur among the Society Islands, the Gambier Islands, and many other groups. Fringing reefs are collections of coralline formation, which are found skirting the coasts of an island in the same manner as the barrier reefs, but without any interior deep water channel. They are found in almost all the groups. From the fact of some of these islands being undoubtedly volcanic, it has been argued that all were originally of the same character, those of coralline formation being based upon the crests of submarine volcanoes, over which the coral insects have for an indefinite series of years been rearing their limestone structures. In opposition to the received volcanic theory, Darwin propounded one of his own—namely, the *theory of subsidence*, which after mature consideration, he deems the only one adequate to explain the various phenomena observable in the coral atolls, barrier reefs, and fringing reefs of the Pacific. All these he considers as being the production of saxigenous insects, working upward from the foundations of what were originally so many islands, erect above the surface of the ocean, but which during long ages have been in a state of gradual subsidence. With respect to the atolls, he states his belief that the lagoon is precisely in the place which the top of a shoal, and, in other cases, the highest part of an island, once occupied. So soon as these have sunk to a depth of 120 to 180 ft. below the surface, the coral insects (which it is agreed are never found at a lower depth) commence their operations, and these working on in countless myriads, the sunken island, or a portion of it, is in process of time again reared to the level of the surrounding sea. It must, however, be noted that this subsidence theory (ultimately accepted by Lyell and other distinguished geologists) is

rejected by Murray of the *Challenger* expedition, and by Semper and other Germans. Murray holds that the island-building corals have begun to build on the tops of volcanic islands which happened to be at the level convenient for the polyps. They would, of course, build up to the surface of the water and then build outward. The corals being dependent for food on the ocean would thrive only on the outer edge of a fully formed reef, those on the inner side of the reef would die out. Hence fringing reefs, barrier reefs, and atolls, according to circumstances. Possibly this and Darwin's theory are not mutually exclusive, but may supplement one another.

Though the islands generally are within the tropics, the heat of the atmosphere is delightfully tempered by a succession of land and sea breezes. The soil is exceedingly fertile, and besides the vegetable productions found growing when the islands were first discovered by Europeans, it has given welcome to the orange, lemon, sugar-cane, guava, cotton, potato, melon, and other fruits and plants introduced by foreign visitants. The only native quadrupeds on any of the islands when first visited were pigs, dogs, and rats; but the ox, the sheep, the goat, and even the horse, have since been successfully introduced into many of the groups. The feathered tribes are numerous, likewise insects, and the coasts everywhere abound with a vast variety of fish and crustacea, highly important for food to the inhabitants of those islands in which quadrupeds, native or introduced, are few.

For more particular description of the several groups, see FIJI ISLANDS: FRIENDLY ISLANDS: SANDWICH ISLANDS: ETC.

Melanesia is inhabited mainly by the frizzly-haired, bearded, energetic, impulsive, demonstrative, and often fierce and savage Papuan race (see PAPUA): these peoples, nearly quite black, are easily distinguished alike from Malays (q.v.) and from the brown Polynesian race, found in all the islands of Polynesia proper and in New Zealand (q.v.), and, less pure, in Micronesia also. The negroid-looking Melanesians stand lower in the scale of civilization than the Polynesians; their women hold less honorable position; their institutions are ruder and their customs more savage, cannibalism being almost universal; though they have considerable artistic skill. Their languages differ much among themselves, but are well marked off from the Polynesian tongues. The Mahori stock, the fair or brown Polynesians, are of remarkably pleasing figure and of joyous temperament. In stature fully equal to Europeans, they are well and proportionately built. They are of copper-brown complexion, ranging from lighter to deeper hues. The forehead is in general rather high and open. The hair is long, smooth, dark brown or black, inclining to be curly, but altogether unlike either the frizzled mop of the Melanesians or the straight black hair of the Malays; the beard is slight. The face is oval, lighted up with large dark eyes. The nose is generally short and flat compared with that of Europeans. The mouth is

large, the teeth fine. A cheerful and joyous temper is favored by the warm and healthful climate and the easy means of living, a temper ever ready to vent itself in dancing and singing. The praise of punctilious cleanliness, and of a taste for neatness and order quite exceptional among savages, is due to this people. The women consort as equals with the men, and have only the lighter and feminine tasks relegated to them, of mat, tapa-cloth, and basket making, of fruit-gathering and fishing. Capt. Cook describes the people as 'liberal, brave, open, and candid.' They are ceremonious and stately in many of their customs; yet withal they lived in a state of unmisgiving sensuousness or sensuality. When civilization therefore at last came to them, it found them defenseless against its vices. The use of the intoxicating drink kava, kawa, or Ava (q.v.) prevails, or, till superseded by European and American spirits, prevailed in almost all the Polynesian islands and in Fiji. For the *tabu* institution, also widely in force, see TABU. The languages of the Polynesians are dialects of one common tongue, distinct in structure as in vocabulary from the Malay languages, but distantly related to the Melanesian group.

All the true Polynesians affirm that their original home was in Savaii, presumably the largest of the Samoan islands, which bears that name. For a discussion of this tradition, see MAORIS. Formerly it was commonly held, as by Latham's followers, that the brown Polynesians or Mahoris are Malay in blood, and that they came from Malaysia. Wallace, who holds them ethnologically and linguistically quite distinct from the Malays, is nevertheless of opinion that at some very remote epoch they did come from some part of s. Asia, and partly displaced and partly mingled with the aboriginal Melanesians. Lesson (*Les Polynesiens, leur Origine, leurs Migrations, leurs Langages,* 4 vols., 1881-85) endeavors to prove that New Zealand is really their original seat, and finds affinities for them with Dyaks and Bataks, with some Cambodian races, the Malagasy, and even African tribes.

The Polynesians have generally a government by chiefs, and a rude polytheism under the care of priests, with lofty temples on mounds. Their religious rites scarcely recognize human sacrifices, and cannibalism is on the whole rare, and habitual nowhere. The benignity of their temper extends to the care of the sick and aged, while an uncalculating hospitality is universal. The dress is scant and simple, yet on state occasions the chiefs are arrayed in the beautiful tapa-cloth.

They have no metals and no pottery, and all their cooking is done by baking, generally in the holes of the earth. Their houses are oval, with strong roofs of rafters and thatch. They yet display remarkable taste in their manufactures and mode of living. They weave mats of exceeding delicacy, and beat out bark-cloth to the thinness of

white paper, joining the pieces together into rolls of hundreds of yards long, ornamented variously and beautifully. Their bowls and plates of wood, their cups and bottles of cocoa-nut, the handles of their tools and clubs and paddles, all are carved with marvellous taste. Their canoes, sometimes over a hundred ft. long, and taking many years to make, are particularly ingenious and strong. The Polynesians are fearless sailors, freely venturing on voyages of many hundreds of miles from their homes.

But with the progress of 'civilization,' this description is unhappily ever becoming less and less applicable to an ever-diminishiug population. When discovered by Europeans more than a hundred years ago, the Polynesians were a very healthy and populous people; now they are everywhere rapidly decreasing in numbers. Captain Cook believed the war canoes of the Society Islands to be manned by 68,000 men; the total pop. of that group is now 17,000 The inhabitants of the Tonga Islands (1847), 40,000 or 50,000, are now (1900) only 18,959. The Marquesas Islanders, reckoned (1850) 50,000, are now (1900) 4,280,

Melanesian, Micronesian, and Polynesian islands almost all are more or less directly under European influence; and there has of late been new rivalry in this region. In Melanesia, Great Britain has annexed most of the s. shore of New Guinea, the Louisiade and D'Entrecasteaux Islands, and occupies Fiji and Rotuma; in Polynesia Britain possesses, besides New Zealand, the Friendly, Cook, Gilbert, Ellice, Solomon, Santa Cruz and other islands. The w. part of New Guinea is Dutch. Germany has great influence in many of the Pacific islands, the trade of many being mainly in German hands. Germany holds the northern section of s. e. New Guinea, and the Caroline, Pelew, and (Guam excepted) the Marianne islands; the largest of the Navigator Islands; the Marshall and Solomon Islands and Bismarck Archipelago, the latter including N. Britain and Admiralty Islands. The French hold the Loyalty Islands and New Caledonia (the latter as a convict settlement), and have alarmed the Australians by proposing to extend their penal stations in this region; they also exercise a protectorate over the Society and Marquesas Islands, and the Low Archipelago and the Tubuai or Austral Isles. Since 1898 the Hawaiian group has been a dependency of the United States, which also holds Tutuila and the Island of Guam. The Gilbert, Marshall and Caroline Islands have been practically ruled by missionaries from the United States. The Pacific Islands have long been a favorite field of Christian missions; Fiji is now a centre of Christian civilization, and in many others marvellous influence for good has been exerted. The London Missionary Soc. (Congl.), the missions of the Church of England, the Wesleyans, the American Board of Missions, and the Presb. Churches of Scotland and Canada, all have active work in one or more districts. See MISSIONS, CHRISTIAN.

POLYNOMIAL, n. *pŏl'ĭ-nō'mĭ-ăl* [Gr. *polus*, many, *on'ŏma* or *on'uma*, a name]: an algebraic quantity consisting of many terms: ADJ. pertaining to; containing many terms or many names. POLYONOMOUS, a. *pŏl'ĭ-ŏn'ō-mŭs*, having many names or titles. POLYON'OMY, n. *-ō-mĭ*, or POLYON'YMY, n. *-ĭ-mĭ*, variety of different names; the description of the same object under several names. POLYONYM, n. *pŏl'ĭ-ō-nĭm*, an object that has different synonyms by which it may be expressed.

POLYOPTRON, n. *pŏl'ĭ-ŏp'trŏn*, or POL'YOP'TRUM, n. *-trŭm* [Gr. *polus*, many; *optikos*, belonging to the sight; *opsŏmai*, I shall see; *horaō*, I see]: a glass with a lens so formed that, when it is looked through, objects appear multiplied, but diminished in size.

POLYORAMA, n. *pŏl'ĭ-ō-râ'mă* [Gr. *polus*, many; *hor'āma*, what is seen]: a view of many objects.

POLYP, or POLYPE, n. *pŏl'ĭp* [F. *polype*—from L. *pol'ypus*; Gr. *pol'upous*, a polypus—from Gr. *polus*, many; *pous*, a foot]: a term variously and indiscriminately applied to different animal forms, but properly designates a cœlenterate of the class Actinozoa, represented by the sea anemones, corals, and the like; or any member (or zoöid) of a compound organism belonging to that class. The term *polypide* is also employed to designate each member or zoöid of the compound forms in the Polyzoa. The name *polypidom* applies to the entire outer framework or skin-system of a compound form, such as a hydrozoan, zoophyte or an individual polyzoön. The word *polypite* refers to each separate zoöid or member of a compound zoophyte or hydrozoön.

POLYPARY, n. *pŏl'ĭ-păr-ĭ*, or POL'YPA'RIA, n. plu. *-pā'rĭ-ă* [L. *polypus*, a polypus]: a coral so called because produced by polyps; the hard chitinous covering secreted by many of the Hydrozoa. POLYPAROUS, a. *pŏl-ĭp'ă-rŭs*, producing many.

POLYPETALOUS, a. *pŏl'ĭ-pĕt'ă-lŭs* [Gr. *polus*, many, *pet'alon*, a leaf]: in *bot.*, having many petals; having the petals of the corolla perfectly distinct and not cohering.

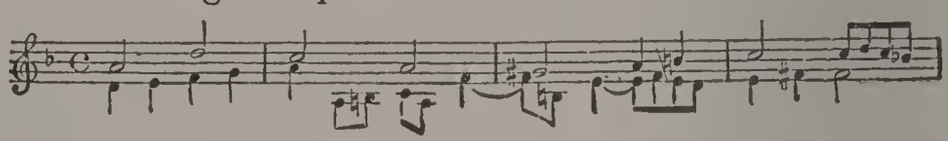
POLYPHAGOUS, a. *pŏl-ĭf'ă-gŭs* [Gr. *polus*, many; *phagein*, to eat]: omnivorous; dependent on different kinds of food.

POLY-PHASE: the same as multiphase. See ELECTRICAL MACHINES—*Alternating Current Dynamos.*

POLYPHE'MUS: genus of *Branchiopoda* (q.v.), of order *Cladocera*, remarkable for extraordinary size of the solitary eye (really double), which occupies almost the whole head. One species, *P. stagnorum*, is common in stagnant pools and ditches. It is about the size of a flea, and moves rapidly in the water, with all kinds of evolutions, employing both its legs and antennæ in swimming.

POLYPHEMUS, *pŏl-ĭ-fē'nŭs*, in the Homeric Mythology: most celebrated of the fabulous Cyclops (q.v.), who inhabited the island of Sicily; son of Poseidon and the nymph Thoosa. He was of immense size, and had only one eye. When Ulysses landed on that island, he entered the cave of P. with 12 companions, of which number this tremendous cannibal ate six. The others stood expecting the same fate, but their cunning leader made P. drunk, then burned out his single eye with a blazing torch, and so escaped, leaving the blinded monster to grope about in the darkness.

POLYPHONY, n. *pŏl-ĭf'ŏ-nĭ*, or Polyph'onism, n. *-ŏ-nĭzm* [Gr. *polus*, many; *phōnē*, a sound]: the multiplication of sounds or voices, as in the reverberation of an echo. Polyph'onous, a. *-nŭs*, or Polyphonic, a. *pŏl'ĭ-fŏn'ĭk*, having many sounds or voices, or assuming them. Applied to a musical composition of two or more parts, each of which has an independent melody of its own; in distinction from a homophonic composition, consisting of a principal part with a leading idea, and accessory parts employed to strengthen it. Each part of a polyphonic composition aims at melodic perfection, and while supporting the other, has an equal share in the entire effect, as in the following example:



A Fugue (q.v.) is the most perfect example of polyphonic composition. The difference between homophonic and polyphonic compositions is not always so marked as to leave it free of doubt whether a part is subordinate or independent; and many compositions consist of an alternation of homophonic and polyphonic passages. The construction of polyphonic phrases is called Counterpoint. Polyphonist, n. *pŏl-ĭf'ŏ-nĭst*, one who professes the art of multiplying sounds; a ventriloquist.

POLYPHORE, n. *pŏl'ĭ-fōr* [Gr. *poluphoros*, bearing much; Gr. *polus*, many; *phoros*, bearing]: in *bot.*, a fleshy receptacle with many ovaries—as in the strawberry and raspberry.

POLYPHYLLOUS, a. *pŏl'ĭ-fĭl'lŭs* [Gr. *polus*, many; *phullon*, a leaf]: composed of many subordinate pieces or leaves: many-leaved. Pol'yphyl'ly, n. *-fĭl'lĭ*, the increase in the number of organs or leaves in a whorl.

POLYPI, *pŏl'ĭ-pī*, or POLYPS, *pŏl'ĭps:* class of animals which were, till recent years, included in the RADIATA of Cuvier, but which, since the Radiata have ceased to be regarded as a sub-kingdom, have found a place in the sub-kingdom CŒLENTERATA: see SUB-KINGDOMS, ANIMAL. The name *Polypi*, or *Polyps*, was given by Reaumur about the middle of the 18th c. to these animals, on account of their external resemblance to the many-armed cuttle-fishes which were so denominated by Aristotle; and our knowledge of these organisms, as members of the animal kingdom, dates back little beyond a century. All P. are aquatic in their mode of life, and almost all are inhabitants of the sea, two genera only (*Hydra* and *Cordylophora*) of fresh-water P. being as yet known. Most of them live in societies of considerable extent, supported on a common stock, to which the term *polypidom* (polyp-home) is usually given, and which is sometimes horny, sometimes calcareous. The P. are either embedded in cavities in the substance of the calcareous polypidom, or inclosed in minute cups or tubes, from which the body can be protruded, and into which it can be retracted at pleasure, in the horny polypidoms. The solitary species often attain considerable size (e.g., many of the Actinias); but the social P. are always minute, though the combined power of some of the species in modifying the earth's crust is neither slight nor limited in extent. 'They have built up a barrier reef along the shores of New Caledonia for a length of 400 m.; and another, which runs along the n.e. coast of Australia, 1,000 m. in extent. To take a small example: a single atoll (or coral island) may be 50 m. in length by twenty in breadth; so that if the ledge of coral rock forming the ring were extended in one line, it would be 120 miles in length. Assuming it to be a quarter of a mile in breadth, and 150 feet deep, here is a mound, compared with which the walls of Babylon, the great wall of China, and the pyramids of Egypt are but children's toys; and built, too, amid the waves of the ocean, and in defiance of the storms.'—Owen, *Lectures on the Invertebrate Animals*, 2d ed., p. 143. It is a stubborn error that speaks of them as 'insects that build the coral reef.' They are not insects, and do not build except as we build our bones.

The bodies of these animals are generally soft, and cylindrical or oval in shape; and the mouth, which is the only aperture of the digestive canal and is quite destitute of any masticating apparatus, lies in the centre of the anterior or free extremity of the body, and is surrounded by a fringe or circle of tentacles or arms. The skin in the social P. is exceedingly soft and delicate; but in the solitary species it is often leathery. It almost always contains peculiar urticating organs, or thread-like cells, which may be regarded as one of the distinctive characters of the Cœlenterata. Various arrangements of the P. have been proposed, but it is sufficient for all practical purposes if we admit two orders—the *Hydrozoa* and the *Anthozoa* (or *Actinozoa*), which differ essentially in the following points: in the *Hydrozoa*, the wall of the digestive sac is not sepa-

rated from that of the somatic (or bodily) cavity, and the reproductive organs are external; while in the *Anthozoa*, the wall of the digestive sac is separated from that of the somatic cavity by an intervening space, subdivided into chambers by a series of vertical partitions, on the faces of which the reproductive organs are developed. The HYDRA (q.v.), or Fresh-water Polyp, is the type of the *Hydrozoa;* it is so small as to be easily overlooked. A few of these P. are simple animals, e.g., *Hydra*, *Corymorpha*, *Vorticlava*, and *Myriothela;* but the greater number are compound or composite, exhibiting a numerous colony connected with one another by a common trunk or *cœnosarc* [from Gr. *koinos*, common, and *sarx*, flesh], which usually presents an erect tree-like form. For form and structure of the *simple* P. of the class, see HYDRA: see also the accompanying figure of *Corymorpha nutans*, which attains a length of four or five

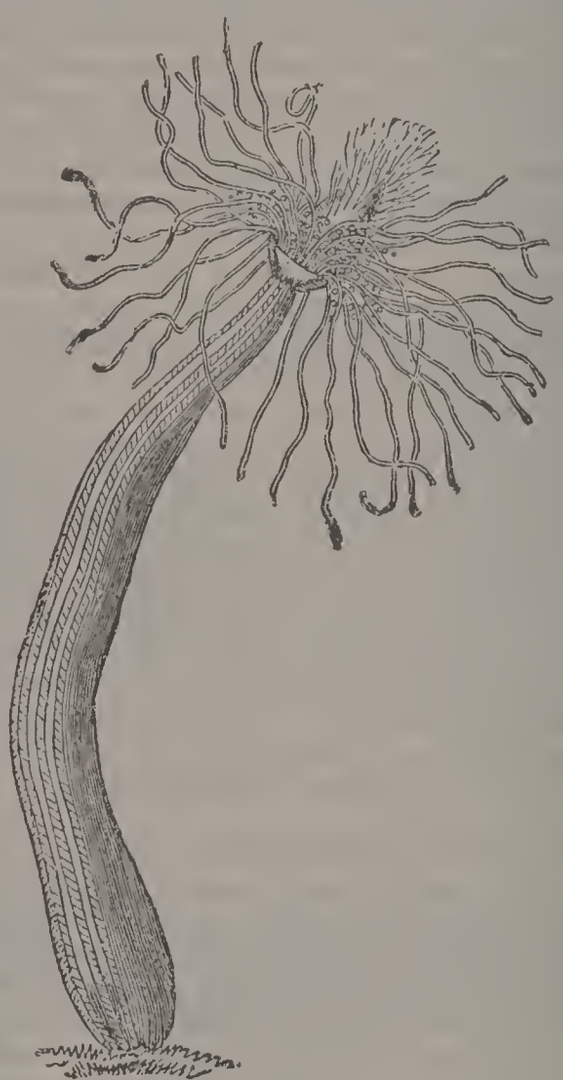


Fig. 1—Corymorpha nutans.

inches, and was discovered by Forbes and Goodsir when dredging in n. Scotland. They observe, that when it was placed in a vessel of sea-water, it presented the appearance of a beautiful pink flower, its head gracefully nodding (whence the specific name given to it by Sars, who had previously discovered it on the Norwegian coast), and bend

ing the upper part of the stem; it waved its long white tentacles to and fro at pleasure, but seemed to have no power of contracting them. The *compound* Hydrozoa include, *inter alia*, the orders *Sertularidæ* (embracing the various species of *Sertularia*, *Campanularia*, *Laomedea*, etc.) and *Tubularidæ* (embracing the various species of *Tubularia*, *Eudendrium*, *Bimeria*, etc.). A good idea of the nature of the compound Hydrozoa may be formed from the consideration of the *Campanularia dichotoma*, a common organism on some shores. The compound polyp-animal, or association of P., resembles a miniature tree. It consists essentially of a ramified tube of irritable matter, *f*, defended by an external flexible, and frequently jointed horny skeleton, *a*, and is fed by the activity of the tentacula, *d*, and by the digestive powers of the alimentary sacs (*g*) of a hundred polypi, the common produce of which circulates through the tubular cavities for the benefit of the whole community. The soft integument of the nutrient P. (*d*, *e*, *g*) contains the thread-cells, above alluded to:

Fig. 2.—Campanularia dichotoma, magnified.

these are protruded when the skin is irritated, and give the tentacles the appearance of being beset by minute bristles. The digestive sac of each polyp is lined by a ciliated epithelium; but there is a perforation at the base communicating with the central tube, *f*. This outlet admits only of the passage of the fluid contents of the stomach, undigested matters being ejected by the mouth. There is reason to believe that sea-water enters the branches of the tube *f*, and circulates by means of the ciliated epithelium, through the compound organism; and by this means contributes to the respiratory process. 'At certain points of these ramified polyps,' says Prof. Owen, 'which points are constant in and characteristic of each species, there are developed little elegant vase-shaped or pod-shaped sacs, which are called the ovigerous vesicles.

or *oviscapsules*. These are sometimes appended to the branches, sometimes to the axillæ, as at *h*, *i*, *k* (in fig 2). They are at first soft, and have a still softer lining membrane, which is thicker and more condensed at the bottom of the vesicle. It is at this part that the ova or germs are developed, and for some time these are kept in connection with the vital tissue of the polyp by a kind of umbilical cord. In all the compound *Hydrozoa*, the ovicapsules are deciduous; and having performed their functions in relation to the development of the new progeny, drop off like the seed-capsules of plants.' On other individuals of the same species, sperm-capsules are developed, which, in form, resemble the ovicapsules, but in place of ova, contain spermatozoa. The act of fertilization in most cases occurs by diffusion of the spermatozoa in the surrounding water. There is much that still requires elucidation in reference to the various modes of reproduction of this class. Many of the Hydrozoa have been shown to be merely larval forms of Medusæ: see GENERATIONS, ALTERNATION OF.

The leading anatomical distinction between the *Anthozoa*, or *Actinozoa*, and the *Hydrozoa* has been already noticed. The common *Actinia* (q.v.) may be regarded as the type of this class, all of which are marine, inhabiting principally the warmer or tropical seas. Many of the larger tropical P. of this class combine with a structure similar to that of the Actinia an internal calcareous axis or skeleton, which, penetrating into the interior of the organism, presents the lamellated and radiated structure recognizable in the *Fungiæ*, and in the skeletons of *Caryophyllæ*, *Madreporæ*, etc. Such Anthozoa are termed coralligenous; and every hard structure deposited in or by the tissues of this class, and forming a uniform framework, is recognized by zoologists as a coral. Like the members of the preceding class, many of the Anthozoa multiply freely by gemmation, complex or compound animals or colonies of animals being formed, in which individual P. are united by a cœnosarc or polypidom. For a description of the mode in which communication takes place between the common body or mass and the individual P., see ALCYONIUM. Various arrangements of this class have been proposed by zoologists. If we exclude the fossil genera, we may divide the Anthozoa into two orders—*Alcyonaria* and *Zoantharia*.

The *Alcyonaria* may be characterized as Anthozoa in which each polyp is furnished with eight tentacles, not simple, as in Actinia, but with pinnate margins, with eight somatic chambers and eight mesenteries. With the exception of one genus, they all are composite in structure; their P. being connected by a cœnosarc traversed by prolongations of the somatic cavity of each polyp, a system of canals being thus formed whose parts freely communicate and are readily distensible. Carus, mainly adopting Milne-Edwards's arrangement, divides the Alcyonaria into three families: 1. *Alcyonidæ*; 2. *Gorgonidæ* (Sea-fans); 3. *Pennatulidæ* (Sea-pens). (For more recent classification of Hydrozoa and Actinozoa, see ZOOLOGY—*Cœlenterata*.) In

the *Alcyonidæ*. Carus includes the beautiful organ-pipe corals, of which Green and others make a separate family. The polypidom constructed by *Tubipora musica* consists

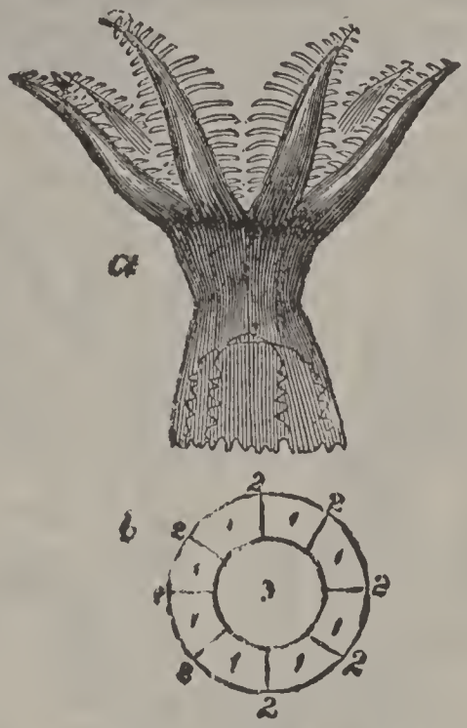


Fig. 3.—Diagram illustrating the Morphology of Anthozoa:
a, polyp of *Alcyonium*; *b*, ideal section of the same; 1, 1, 1, etc., the somatic cavity, divided by the mesenteries, 2, 2, 2, etc., into eight chambers; 3, the digestive cavity.

of successive stages of cylindrical tubes of rich crimson color, united at various heights by horizontal connecting

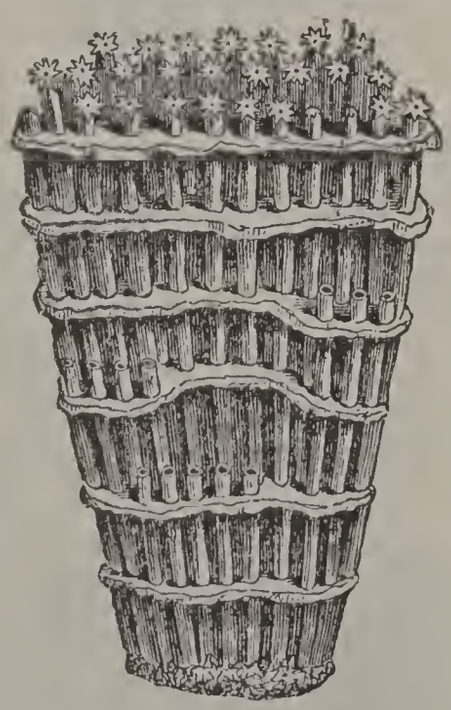


Fig. 4.—Tubipora musica.

plates. The tubes placed upon the upper stage are alone inhabited by living P., of violet or green color, the occupants of those below having successively perished as fresh

generations appeared above them. An example of the *Gorgonidæ* is *Isis hippuris*, in which the skeleton is made up of alternate joints of calcareous and horny matter, to give necessary flexibility. In *Pennatulidæ*, the polypidom is free, and no P. are attached to its basal portion. The *Sea-pens* (*Pennatulæ*) afford a good example of this family: see PENNATULA for description and figure.

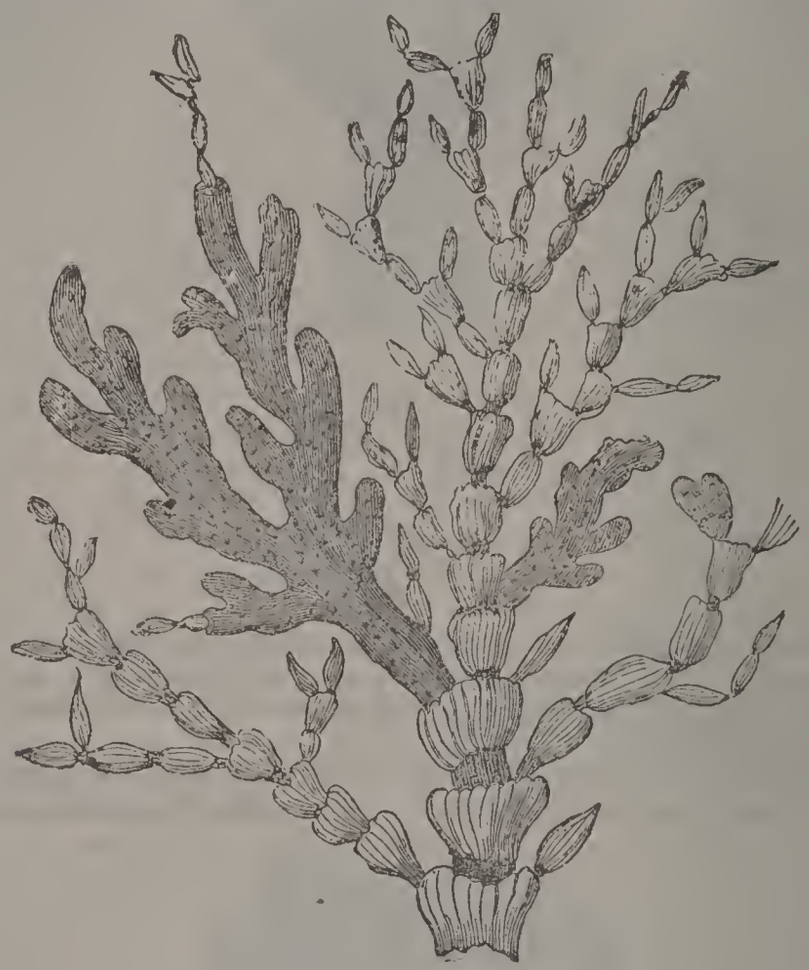


Fig. 5.—Isis hippurus.

The *Zoantharia* may be characterized as Anthozoa in which the tentacles are either simple or branched, in general numerous, and together with the mesenteries, disposed in multiples of five or six. They may be arranged in the three following sub-orders—1. *Z. Malacodermata*, 2. *Z. Sclerobasica* or *Antipatharia* (Milne-Edwards); and 3. *Z. Scleroderma ta* or *Madrepores*. The first sub-order has been variously subdivided into families and sub-families. It contains all the sea-anemones and animals allied, including genera *Actinia*, *Anthea*, *Corynactis*, *Capnea*, *Adamsia*, *Ilyanthus*, *Sagartia*, *Bunodes*, *Edwardsia*, *Peachia*, etc.; and the *Zoanthidæ*, which are aggregated P. arising from a common creeping root-like fleshy band. All the members of the second sub-order are composite structures. *Antipathes*, type of the group, presents a stem-like, simple, or branching cœnosarc, which in one species tapers to a length of more than nine ft., with a diameter, at the base, not exceeding three-tenths of an inch. The third sub-order (*Madrepores*) is very extensive. It is divided into

Madrepora aporosa and *M. perforata*, according as the coral exhibits a solid or a porous structure. *M. aporosa* may be arranged in the following families—1. *Turbinolidæ* (including sub-families *Caryophyllinæ* and *Turbinolinæ*); 2. *Oculinidæ;* 3. *Astræidæ;* 4. *Echinoporinæ;* 5. *Merulinaceæ;* 6. *Fungidæ:* while the *M. perforata* are divided into (1) *Madreporidæ* and (2) *Poritidæ*. For a few of the commoner forms of Madrepora, see CORAL: MADREPORE.—See Dana, *Structure and Classification of Zoophytes*, and other works; Johnston, *British Zoophytes;* Milne-Edwards and Haime, *Histoire Naturelle des Coralliaires ou Polypes;* Lacaze-Duthiers, *Histoire Naturelle du Corail;* Greene, *Manual of the Cœlenterata;* Hincks, *British Hydroid Zoophytes*—excellent and well-known monograph; Gegenbaur, *Comparative Anatomy;* the works of Huxley, Agassiz, Claus, Hertwig, and Haeckel; and many papers or communications in transactions of learned societies.

POLYPIDE, n. *pŏl'ĭ-pĭd* [L. *pol'ypus*, a polypus; Gr. *polus*, many; *pous* or *poda*, a foot]: in *zool.*, the separate zooid of a Polyzoon. POLYPITE, n. *pŏl'ĭ-pīt*, the separate zooid of a Hydrozoon; a fossil coral. POLYPIDOM, n. *pŏl-ĭp'ĭ-dŏm* [L. *domus*, a house]: one of the stems or fabrics containing the polyps or animals which construct them; a coral; the dermal system of a colony of the Hydryzoa or Polyzoa.

POLYPIFER, n. *pŏl-ĭp'ĭ-fĕr* [L. *pol'ypus*, a polypus; *fero*, I bear]: that which produces polypi. POLYPIFEROUS, a. *pŏl'ĭp-ĭf'ĕr-ŭs*, bearing or producing polypi.

POLYPITE: see under POLYPIDE.

POLYPODE, n. *pŏl'ĭ-pŏd* [Gr. *polus*, many; *pous* or *poda*, a foot]: an animal with many feet; the millepede.

POLYPODY, n. *pŏl'ĭ-pŏd'ĭ* [Gr. *polus*, many; *pous*, or *poda*, a foot]: fern of genus *Polypodium*. POLYPO'DIUM, genus of ferns, with spore-cases on the back of the frond, distinct, ring-shaped, in roundish *sori*, destitute of *indusium*. About 400 species are known, some of which differ considerably in appearance: only 9 species are known in N. America. The most common in England and the United States is *P. vulgare:* it grows on rocks, trees, dry banks, etc., and has fronds 2–18 inches long, deeply pinnatifid, with large sori.—*P. Dryopteris*, with delicate ternate bipinnate fronds, is a fine ornament of dry stony places in Scotland. *P. Calaguala*, native of Peru, is said to have important medicinal properties—solvent, deobstruent, sudorific, etc.

POLYPOROUS, a. *pŏl-ĭp'ŏ-rŭs* [Gr. *polus*, many; *poros*, a passage; *poroi*, pores of the skin]: having many pores; ethmoid; descriptive of those species of fungi found in pastures, on trunks of trees, etc., whose under surfaces are full of pores. POLYPORITES, n. plu. *pŏl-ĭp'ŏ-rīts*, fossil fungus-like organisms found in certain Coal-measures. POLYPORUS, very large genus of hymenomycetous fungi, type of ord. *Polyporiaceæ:* see AMADOU: DRY ROT.

POLYPOUS: see under POLYPUS.

POLYPRISMATIC, a. *pŏl'ĭ-prĭz-măt'ĭk* [Gr *polus*, many, and Eng. *prismatic*]: in *min.*, having crystals presenting numerous prisms in a single form.

Polypodium:
1, P. dryopteris; 2, P. vulgare.

POLYPTERUS, *pō-lĭp'tē-rŭs:* genus of fishes, ranked by Cuvier among malacopterous fishes and in the family *Clupeidæ*, notwithstanding very important differences of structure; but now constituted by Müller and others into a family, *Polypteridæ*, of the order Ganoid Fishes. The shape is round and elongated; head defended by large bony plates, body covered with large and strong ganoid scales very closely affixed to the skin. These curious fishes, existing remains of a type prevalent in former geologic periods, inhabit the rivers of Africa and lodge in the soft mud. Their flesh is good food. The P. of the Nile, called *Bichir* by the Egyptians, is said to be one of the finest fishes of that river: it is about 18 inches long.

POLYPUS, *pŏl'ĭ-pŭs*, in Surgery: term denoting any sort of pedunculated tumor attached to a surface to which it was supposed to adhere like a many-footed animal, as its name indicates. The name is not usually given to malignant tumors. The most common seat of P. is the mucous membrane, especially that of the nostrils and uterus; but these tumors are found also in the rectum, the larynx, and the external auditory passage of the ear. The only satisfactory mode of treatment consists in their removal, which must be effected in various ways, according to their position, as by forceps, a wire snare, the ligature etc.

POLYPUS, n. *pŏl'ĭ-pŭs*, POL'YPI, n. plu. *-pī* [L. *polypus;* Gr. *polupous*, a polypus (see POLYPI)]: that which has many feet or roots; a pear-shaped tumor attached by its thin end or stalk to some mucous membrane. POL'YPOUS, a. *-pŭs*, resembling polypi; having many feet or roots.—The *Polypus* of the ancients was the animal now known as the Poulpe (see POULPE: CEPHALOPODA).

POLYRHIZOUS, a. *pŏl'ĭ-rī'zŭs* [Gr. *polus*, many; *rhiza*, a root]: in *bot.*, possessing numerous rootlets independently of those by which the attachment is effected.

POLYSARCIA, n. *pŏl-ĭ-sâr'sĭ-a* [Gr. *polusarkia*, fleshiness; *polus*, much; *sarx, sarkos*, flesh]: in *bot.*, superabundance of sap causing unnatural growth; in *pathol.*, obesity.

POLYSCOPE, n. *pŏl'ĭ-skōp* [Gr. *polus*, many; *skopĕō*, I view]: a glass through which objects appear multiplied.

POLYSEPALOUS, a. *pŏl'ĭ-sĕp'ă-lŭs* [Gr. *polus*, many, and Eng. *sepal*]: in *bot.*, applied to plants where the sepals of a calyx have no cohesion; having a calyx composed of separate sepals.

POLYSPERM, n. *pŏl'ĭ-spĕrm* [Gr. *polus*, many; *sperma*, seed]: a pericarp containing numerous seeds. POL'YSPER'MOUS, a. *-spĕr'mŭs*, many-seeded.

POLYSPOROUS, a. *pŏl'ĭ-spōr'ŭs* [Gr. *polus*, many; *spora*, seed]: in *bot.*, having many seeds.

POLYSTEMONOUS, a. *pŏl'ĭ-stĕm'ŏ-nŭs* [Gr. *polus*, many; *stēmōn* or *stēmŏna*, the warp in the ancient upright loom—from *histēmi*, I stand]: in *bot.*, having the stamens more than double the sepals or petals in number.

POLYSTIGMA, n. *pŏl'ĭ-stĭg'mă* [Gr. *polus*, many; *stigma*, a mark]: very minute species of brown fungi found in autumn on live sloe and bird-cherry leaves. POL'YSTIG'MOUS, a. *-mŭs*, applied to plants where a flower has many carpels, each originating a stigma.

POLYSTOME, n. *pŏl-ĭs'tōm* [Gr. *polus*, many; *stoma*, a mouth]: in *zool.*, an animal having many mouths, as certain of the Protozoa. POLYSTOMOUS, a. *pŏl-ĭs'tŏ-mŭs*, in *zool.*, having more than two suckers or mouths; in *bot.*, having many suckers in the same fibril or root.

POLYSTYLE, n. *pŏl'ĭ-stīl* [Gr. *polus*, many; *stūlos*, a column or pillar]: in *arch.*, portico between rows of pillars; an edifice having many columns, but not the exact number of any of the classic arrangements. POL'YSTYL'OUS, a. *stīl'ŭs*, in *bot.*, applied to a compound ovary having several distinct styles.

POLYSYLLABLE, n. *pŏl'ĭ-sĭl'lă-bl* [Gr. *polus*, many; *sul'labē*, a syllable]: a word of many or more than three syllables. POL'YSYLLAB'IC, a. *-sĭl-lăb'ĭk*, or POL'YSYLLAB'ICAL, a. *-ĭ-kăl*, pertaining to or consisting of many syllables, or of more than three.

POLYSYMMETRICAL, a. *pŏl'ĭ-sĭm-mĕt'rĭ-kăl* [Gr. *polus*, many; Eng. *symmetrical*]: in *bot.*, having a member which can be divided by several planes into portions, each the reflected image of the other.

POLYSYNDETON, n. *pŏl'ĭ-sĭn'dĕ-tŏn* [Gr. *polus*, many *sundĕtos*, connected—from *sun*, with, and *dĕō*, I bind]: a figure of speech, in which the conjunction is often repeated where usually suppressed.

POLYSYNTHETIC, a. *pŏl'ĭ-sĭn-thĕt'ĭk* [Gr. *polus*, many; *sun'thĕsis*, a writing or composition]: a term applied to the general grammatical structure of the languages of the American Indians, which are all said to agree in grammatical, though differing in glossarial, detail; a term applied to certain languages, especially the American Indian, in which compounds are formed out of several words, with syncope and ellipsis—according to Latham. POL'YSYNTHET'ICISM, n. *-thĕt'ĭ-sĭzm*, or POL'YSYN'THESIS, n. *-thĕ-sĭs*, a polysynthetic character.

POLYTECHNIC, a. *pŏl'ĭ-tĕk'nĭk* [Gr. *polus*, many; *technē*, art]: relating to or comprehending many arts: N. school for instruction in many arts, particularly with a view to their practical application.

POLYTECHNIQUE, *pŏl-ĭ-tĕk'nēk* (ÉCOLE POLYTECHNIQUE), or POLYTECHNIC SCHOOL, *pŏl-ĭ-tĕk'nĭk:* institution established in Paris (1794) by the National Convention, under the name *École des Travaux publics* (School of Public Works). No students were admitted but those who intended to enter the public service; and though the general object was the supplying of well-educated youths to all branches, it was intended particularly for thorough instruction of recruits for the corps of civil and military engineers. The institution received the name 'École Polytechnique' 1795. The pupils were at first 349 in number, and each received, during his stay of two years, an annual stipend of 1,200 francs (about $231); the teachers were in most cases the most eminent savants of France. In 1799 some modifications were introduced into the working of the school; the number of pupils was limited to 200, and they were put into uniform. The advantages of an institution of this sort soon made themselves evident, and the P. rose into high estimation in France and throughout Europe; so that it became common for other nations, when entering into a treaty with France, to stipulate for admission of a certain number of their subjects into the institution, after passing the prescribed entrance examination. In 1804 Emperor Napoleon introduced various modifications into its working, and gave it a military organization; it was also removed from the Palais-Bourbon to the old college of Navarre. The institution became more and more, as the end of the Napoleonic empire drew near, a training-school for young artillerists and engineers; and such was the enthusiasm of the pupils in the emperor's cause, that, after the disasters of 1814, they demanded to be enrolled *en masse* in the ranks of the French army. However, Napoleon was (to use his own words) not inclined 'to kill the hen for the golden eggs;' but he allowed them to form three out of the 12 companies of which the artillery corps of the national guard was composed. These three companies rendered important service in manning the walls of Paris, and behaved heroically in the battle of 1814, Mar. 30.

After the first Restoration, the P., being considered evil-disposed to the govt., suffered considerable reductions. After the second Restoration (1815, July), the staff of professors was remodelled; Lacroix and some others were dismissed, and replaced by Poisson, Arago, Cauchy, etc. Notwithstanding these changes, the govt. still had its doubts as to the loyalty of the establishment, and took advantage of an outbreak, 1816, Apr. 3, to break it up. It was reconstituted in Sep., under a revised code of regulations, and in 1822 the old severity of military discipline was restored. During the war 1870–1, the govt. of national defense ordered the pupils to meet at Bordeaux, and classes were opened there under distinguished pupils of the school brought from all parts of France. This attempt had to be abandoned, and the pupils, having sought permission to take part in the war, were divided among different sections of the army. The constitution of the school, which has so frequently suffered change, was in the end of 1873 regulated by *décret* of 1863, Nov. 30, and ministerial rules issued 1857, Mar. 5. 1. No pupil can be admitted unless he has been successful in the public competitive examination each year. 2. The conditions of admission to the competitive examination are, that the candidate shall be a Frenchman; that he shall be more than 16, and less than 20 years of age, on Jan. 1 of that year; and that he shall be either a bachelor of letters or a bachelor of sciences of the Univ. of France: if he holds both degrees he is allowed 50 marks in the examination for admission. 3. Regular soldiers are admitted up to the age of 25 years, provided they have been on real and effective service for two years. 4. The charge for board is 1,000 francs (about $200) per annum, and the cost of outfit (to be also paid by the pupil) about 600 francs ($120). 5. The duration of the course of instruction is two years: the pupils, after finishing their course, must pass a final examination; the successful candidates, if found physically qualified, are arranged in order of merit, and choose in order what branch of the public service they wish to enter. 6. The branches of the public service recruited from the P. are the corps of land and naval artillery, military and naval engineers, the national marine, the corps of hydrographic engineers, that of engineers of roads, bridges, and mines, the corps of staff-officers, the superintendence of telegraphs and gunpowder and tobacco manufactories; and generally every dept. which, requiring special scientific knowledge, may be added by *décrets* to these.

The following branches of study were embraced in the revised curriculum: mathematics, physics, chemistry and chemical manipulation, history and literature, German, written exercises, drawing, geodesy, mechanics, architecture, art militaire. Lessons in fencing, music, and dancing are given as optional, and must be separately paid for. The number of pupils varies with the requirements of the public service. In 1794 there were 396 pupils; in 1820 only 66. During the first empire the numbers increased from (1808) 110 to (1813) 227: under Louis Philippe the average number was 130. During the second empire it

had risen to 40 and 150. After the war with Germany, 1870-1, the number rose to 260. At the present time it is the institute in which France trains her artillery and engineer officers, her naval engineers, her directors of roads and bridges, and of mines, her telegraph officers, in short, all her officials who require to know something of the higher branches of technical science. The numerous and admirably equipped technical schools of Germany (see TECHNICAL EDUCATION), often called *Polytechnica,* have received no military restriction, and are available for all interested in the industrial arts; they are in many cases scientific centres comparable to the universities. See TECHNICAL SCHOOLS; MILITARY SCHOOLS; EDUCATION, NATIONAL SYSTEMS OF—*Great Britain and Ireland, France, Germany, Italy, Japan,* etc.; EDUCATION IN THE UNITED STATES—*Higher Education;* and the paragraphs on education under the nations.

POLYTHALAMIA, n. *pŏl'ĭ-thă-lā'mĭ-ă* [Gr. *polus,* many; *thal'ămos,* a chamber]: an order of minute animals inclosed in calcareous shells, each consisting of a series of distinct chambers—these shells occur in such vast numbers that the fine calcareous sand of the seashore and sea-bottom is entirely composed of their microscopic remains; foraminifera. POL'YTHAL'AMOUS, a. *-thăl'ă-mŭs,* having many chambers or cells.

POLYTHALMIC, a. *pŏl'ĭ-thăl'mĭk* [Gr. *polus,* many, several; *thal'ămos,* a chamber]: in *bot.,* applied to fruits formed from several pistils.

POLYTHEISM, n. *pŏl'ĭ-thē-ĭzm* [Gr. *polus,* many; *thĕŏs,* a god]: the doctrine of a plurality of gods having an agency in the government of the world. POL'YTHE'IST, n. *-ĭst,* one who believes in a plurality of gods. POL'YTHEIS'TIC, a. *-ĭs'tĭk,* or POL'YTHEIS'TICAL, a. *-tĭ-kăl,* pertaining to or consisting in polytheism. POL'YTHEIS'TICALLY, ad. *-kăl-lĭ.* See GOD. Polytheism appears to be a development of fetishism. Fetishism is founded on primitive man's view of all nature, animate and inanimate, as consisting of beings possessing attributes similar to his own—sensibility, will, feelings, passions, benevolence and malevolence; and as these beings or objects, like his fellow-men, were conceived by him to possess the power to help or hurt him, he would, to win their aid in his necessities, flatter or cajole them or venerate them, or, when they proved false to him, treat them with curses and outrage; or he would stand in terror of them if he had incurred their enmity. Since for the fetishist all nature is endowed with life and sense, the savage man apprehends even stones anthropomorphically: the Caaba at Mecca is doubtless a survival of primeval fetish worship. Other notable objects of fetish-worship are mountains: Mount Carmel would seem to have been an object of adoration: hence the *Deus Carmelus* of Suetonius (Vespasian); so wind and fire, so plants: sacred

trees are common in nature-religions; of animals, the crocodile was worshipped by the Egyptians; and in all the ethnic religions of antiquity the sun, moon and stars, and the heavens were held to be gods and were objects of worship. From the lowest fetishism is but a step to the polytheism of the highest-cultured peoples of antiquity, in which the gods are demonstrably the very same natural objects—the sky (Zeus, Jupiter), the sea (Neptunus, Oceanus), the sun (Sol, Helios, Apollo), the moon (Selene, Artemis, Diana), which were worshipped by the fetishists of a ruder age, but which are now clothed with more august attributes. Very curious is the usage of ancient Greek and Latin writers in using *Theos, Deus* (God) and *Theoi, Dî* (gods) interchangeably. For example, in Cicero's dialogue *De Natura Deorum* (*Of the Nature of the Gods*) we read (iii. 37): 'It is the belief of all mankind that good fortune is to be asked of God (*a Deo*), but wisdom of oneself . . . health, wealth, victory of the Gods' (*a Dîs*). Though Cicero in that dialogue intends to discuss the different opinions of the philosophers upon the nature of the gods it never occurs to him to inquire whether Deity is one or manifold.

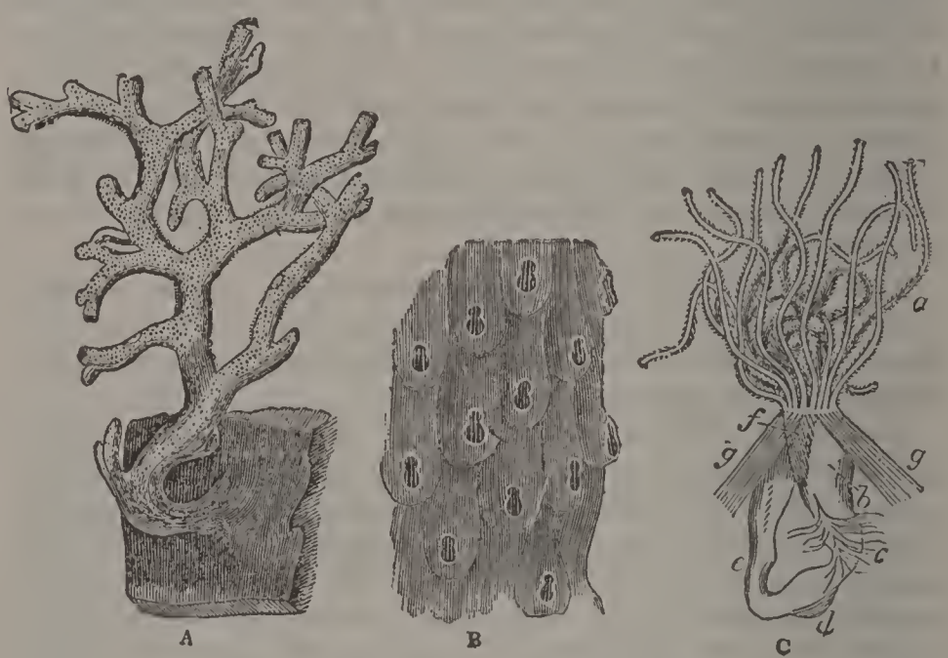
POLYTOMOUS, a. *pŏl-ĭt'ō-mŭs* [Gr. *polus*, many; *tomē*, a cutting]: in *bot.*, having the limb of a leaf distinctly subdivided into many subordinate parts, but not jointed to the petiole.

POLYTRICHUM, *pō-lĭt'rĭ-kŭm* [Gr. many-haired]: genus of mosses, having the capsule supported on a stalk (*seta*) which is terminal, and thus appears as an elongation of the stem; the peristome single, of 32 or 64 short equi-distant teeth, which are curved inward, and their summits united by a horizontal membrane closing the mouth of the capsule. An abundant species is *P. commune*, sometimes called *Hair-moss, Golden Maidenhair*, provincially *Goldilocks;* growing in heaths and woods, particularly where the soil is sandy; the stems not at all branched, or only at the base, several inches long; the narrow slender leaves sometimes nearly half an inch long. This beautiful moss is very common in the most n. parts of Europe and Asia.

POLYURIA, n. *pŏl'ĭ-ū'rĭ-ă* [Gr. *polus*, much; *ouron*, urine]: an excessive flow of urine, as in DIABETES (q.v).

POLYXENE, *pō-lĭks'ē-nē:* daughter of Priam (king of Troy) and Hecuba. She was beloved by Achilles, who in order to obtain her for his wife promised to bring about peace between the Greeks and Trojans. While negotiating the marriage at the temple of the Thrymbræan Apollo, Achilles was treacherously slain. To the Greeks on their homeward way, after the fall of Troy, appeared the shade of Achilles, demanding the sacrifice of Polyxene, and she was sacrificed by Neoptolemus, Achilles's son, over the hero's grave.

POLYZOA, *pŏl-ĭ-zō'ă;* known also as Bryozoa [from Gr. *bryon*, moss, and *zoon*, an animal; because many of these organisms incrust other animals or bodies like moss] and Ciliobrachiata [from their tentacles being ciliated]: class of plant-like animals, chiefly marine; so called from many individuals being united into a colony or polyzoary. Although Dr. Grant, in *Observations on the Structure and Nature of Flustræ*, 1827, and Milne-Edwards and Audouin, in *Résumé des Recherches sur les Animaux sans Vertèbres faites aux îles Chaussey*, 1828, indubitably showed that these animals more closely resembled, in the details of their organization, the molluscous than the radiate sub-kingdom with which they were formerly confounded, some English writers (including Owen) retain them among the Polyps, instead of placing them among the *molluscoid animals*. Another classification ranks them with the *Vermes* (see



Eschara Cervicornis:

A, portion of its coralline fabric, of the natural size; B, portion of a young branch, enlarged, to show the arrangement of the superficial apertures; C, an individual withdrawn from its cell and highly magnified; *a*, mouth; *b*, pharyngeal cavity; *c*, secreting tubes; *d*, the digestive stomach; *e*, the intestinal canal; *f*, the anus; *g*, retractor muscles.

Zoology). Late researches, by Harmer, go to show that the typical forms (sub-class *Eupolyzoa*) are degraded mollusks, or molluscoid. (See *Quart. Jour. Micr. Sci.*, Apr. 1885.)

Most of the P. are microscopic, but as they occur in colonies, they often collectively form conspicuous masses, and though there is little diversity in the form or structure of the animals themselves, there is much difference in the form, arrangement, and composition of the cells or chambers in which the individual animals reside. 'In general,' says Gosse, 'the form of the cell is ovate or oblong; but the general shape is variously modified, being tubular, club-shaped, horn-shaped, cradle-shaped, square, etc.' The arrangement is often shrub-like, or the cells may be

arranged in close series, either adhering in irregular patches, as the *Lepraliæ*, or rising into broad, flexible leaves, as the *Flustræ*, or common sea-mats, or in solid strong walls, or coral-like masses, as the *Escharæ*, or calcareous sea-mats. Each animal lives freely in its cell, with whose walls it is connected only by muscular bands and threads at certain points, and by the covering of the mouth of the cell. The animal may either expand itself to a considerable extent out of the mouth of the cell, or it may be altogether restricted within the latter; their movements being due partly to pressure upon the outer walls, and partly to the muscular bands, which act chiefly as retractors. On examining one of these organisms in the expanded state, the mouth is seen to be surrounded by a crown of tentacles, usually 10 or 12, which are clothed with vibratile cilia, which lash the water toward the mouth, and thus create numberless little whirlpools, by which nutritious matter is conducted into the oral aperture of the polyzoa. These ciliated tentacles, seen in C, *a*, in the figure, constitute one of the essential points of difference between these animals and the hydraform polyps, with which they were formerly associated. The mouth leads to a funnel-shaped cavity or pharynx *b*, which is succeeded by an œsophagus *c*, and a true digestive stomach *d* (between which a muscular gizzard intervenes in certain genera), after which the intestine, *e*, turns back on itself, and terminates in an anus, *f*, near the mouth. In the separate intestine and anal orifice is another characteristic distinguishing these animals from the polyps. At the base of the tentacular circle, just above the anal orifice, is a nervous ganglion, which in all the P. lies on the re-entering angle, between the two extremities of the intestinal canal. No heart has yet been discovered, the matters, which result from digestion, percolating through the intestinal walls, and becoming mixed with the fluid in which the viscera floats. According to Prof. Allman, three distinct modes of reproduction occur in the P., viz., by buds or gemmæ, by true ova, and by free locomotive embryos. This subject, however, requires further investigation.

Minute appendages, very remarkable, are fixed to the cells of many of the genera. They are termed *Avicularia*, or 'Birds'-head Processes,' and *Vibracula*, or whip-like spines. The *Avicularia* were described by Ellis, who first noticed them (in *Essay towards a Natural History of the Corallines*, 1758), as resembling 'a bird's head with a crooked beak, opening very wide;' they consist of a fixed and a movable nipper, like a crab's claw, the latter being worked by special muscles. These moving beaks have been often observed to seize minute animals; but as these organs have no power of passing their prey to the mouth, the P. cannot receive nourishment from this source. Gosse ingeniously suggests that 'the seizure of a passing animal, and the holding of it in the tenacious grasp until it dies, may be a means of attracting the proper prey to the vicinity of the mouth.' The *vibracula* consist of a long slender movable *seta* or bristle, which according to Gosse, serves

to rid the animal of intruding vagrants, and to cleanse away accidental defilement, by sweeping across the orifice of the cell.' Both these kinds of organs are of service in determining genera. See Hincks, *History of British Marine Polyzoa* (in which invaluable work, 2 vols. 1880, the 235 species occurring on the British coast are figured); Huxley's *Anatomy of Invertebrated Animals;* works of Sir Wyville Thomson, and the *Challenger* Reports; Hertwig's works on Marine Animals; Busk's classification in *Catalogue of Marine Polyzoa in the British Museum;* and Allman's 'Report on the Fresh-water Polyzoa,' and Brit. Assoc. Report on *Fossil Polyzoa* (1882, etc.).

POLYZONAL, a. *pŏl'ĭ-zō'năl* [Gr. *polus*, many; *zōnē*, a zone or belt]: composed of several zones or rings, applied to burning lenses.

POLYZOON, n. *pŏl'ĭ-zō'ŏn* [Gr. *polus*, many; *zoon*, animal]: one of the class *Polyzoa.* Polyzoa, n. plu. *pŏl'ĭ-zō'ă*, numerous class of plant-like animals, inhabitants chiefly of the sea (see above). Polyzoarium, n. *pŏl'ĭ-zō-ā'rĭ-ŭm*, the dermal system of a colony of the Polyzoa: see Polypidom, under Polypide.

POMACEÆ, *pō-mā'sē-ē*, or Pomeæ, *pō'mē-ē:* according to some botanists, a nat. order of plants; but more generally regarded as a sub-order of Rosaceæ (q.v.). The plants of this order are trees or shrubs, abundant in Europe, and belong chiefly to the temperate and colder regions of the n. hemisphere; they are rare in very warm climates, and are not found at all in the s. hemisphere. They have the botanical characters described in the article Rosaceæ (q.v.); and in addition are distinguished by having the tube of the calyx more or less globose, the ovary fleshy and juicy, lined with a thin disk, its carpels adhering more or less to the sides of the calyx and to each other; the fruit a *Pome* (q.v.), 1–5-celled, in a few instances spuriously 10-celled; the ovules in pairs, collateral. There are about 200 known species. Many of these species are prized for beauty and fragrance of flowers, some produce valuable timber; but the order is remarkable chiefly as producing a number of the very finest fruits of temperate climates: see Apple: Pear: Quince: Medlar: Loquat: Hawthorn: Cratægus: Amelanchier: Rowan. Service.

POMACEOUS: see under Pome.

POMADE, *pō-mād'*, or Pomatum, n. *pō-mā'tŭm* [It. *pomata*, pomatum—from Fr. *pomme*, L. *pomum*, apple]: fragrant greasy preparation used instead of liquid oil as hair-dressing; anciently made by boiling over-ripe apples in fat, by which the peculiar odor of the fruit was communicated. Poma'tumed, a. *-tŭmd*, dressed with pomatum. —*Pomade* or *Pomatum* consists of a fine inodorous fat, such as lard or suet; but neither of these are quite free from smell, and careful perfumers render them so by a peculiar process. They melt them in a steam-bath, and to every ¼ of cwt. add 1 oz. of alum and 2 ozs. of salt, continuing the action of the heat till any scum ceases to rise; the scum is carefully removed, and the fat allowed to cool.

after which it is levigated with cold water with great care and patience until every particle has been acted upon, and the salt, alum, and albuminous matters are perfectly washed out, after which it is remelted in the steam-bath, and any remaining water falls to the bottom: when cold, it is fit for use. The perfumer then takes portions of this prepared fat, and remelting each separately, adds a little wax or spermaceti to give it consistency, and perfumes it with some essence. The varieties of pomades are as numerous as the perfumed essences.

POMANDER, n. *pō-măn'dĕr* [F. *pomme d'ambre*, apple of amber]: a scent-ball; a perfumed ball or powder; a small ornamental box containing perfumes, carried by ladies suspended from their girdles in the 16th century.

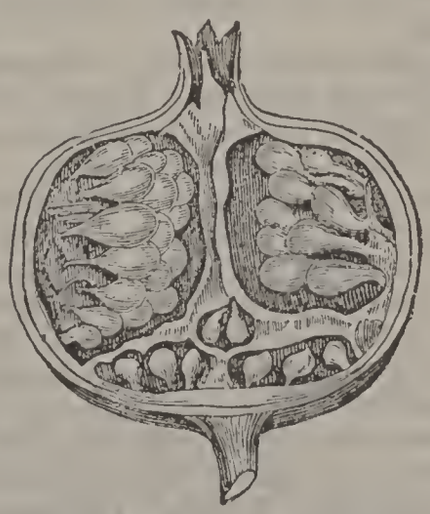
POMBAL, *pom-bâl'*, Dom Sebastiao Jose de Carvalho e Mello, Marquis de: greatest of all Portuguese statesmen, and one of the ablest men of his time: 1699, May 13—1782, May 8; b. at the castle of Soura, near Coimbra; son of Manuel de Carvalho, capt. of cavalry, and of the second grade of nobility. After studying law at Coimbra, and serving a short time in the army, P. was banished from Lisbon on account of his youthful turbulence of disposition, and retired to his birthplace, where he applied himself to study. Subsequently, he married a rich widow, Donna Teresa da Noronha Almada, and repaired to court. In 1739 he was appointed envoy- extraordinary to the court of London and later he was sent to Vienna in a similar capacity. Here P. (whose first wife had died) espoused, 1749, Leonora Ernestina, Countess Daun, niece of the famous Austrian marshal of that name. This marriage had a most felicitous influence on his future. When P. returned to Portugal, the Portuguese queen, who was an Austrian princess, conceived a great attachment to his wife; and when her son, Joseph I., ascended the throne 1750, she induced him to appoint P. state sec. for foreign affairs. Immediately his splendid administrative genius burst forth like a sudden blaze of sunshine. He found his country almost without an army, without a fleet, without commerce or agriculture, and all power in the hands of unscrupulous Jesuits and grasping nobles. Among his first acts was to reattach to the crown a great number of domains that had been unjustly alienated. Then followed reorganization of the army, the checking of the Inquisition, introduction of fresh colonists into the Portuguese settlements, establishment of an E. Indian Company; and a company for Brazil, where he introduced cultivation of coffee, sugar, cotton, rice, indigo, and cocoa. In virtue of a treaty with Spain, 1753, Paraguay became an appanage of the Portuguese crown, and it was in this remote region that P. first came into collision with the Jesuits—founders of the Paraguay missions. He caused his brother, Francisco-Xavier de Mendonça, to be appointed capt.-gen. of Paraguay, and is said to have given him secret instructions to ruin the Jesuits in his reports to the king. At the occurrence of the great earthquake at Lisbon 1755, P. showed almost superhuman courage and energy, in consequence of which the king raised

him to the rank of Count of Œyras, and in the following year appointed him prime minister. He crushed a revolt instigated by the great nobles and the Jesuits, the latter of whom he now removed from the person of the sovereign, deprived of the power of the confessional, and (1757) confined to their colleges. A conspiracy against the life of the king, which broke out 1758, Sep. 3, but failed, placed his enemies completely in his power. The leaders were punished with appalling severity. The Duke of Aveiro and the Marquis of Tavora were broken alive on the wheel, the sons and the son-in-law of the former were strangled, and the wife of the marquis was beheaded. The Jesuits were suspected of complicity in the plot, and P. accused them to the pope; and when the pope would not allow the minister to proceed against them in the civil courts, he daringly caused some to be put to death in prison. Father Malagrida, who had prophesied the death of the king, was delivered over to the Inquisition as a heretic, and condemned to be burned alive; and this *auto-da-fé* actually took place 1761. But P. was not satisfied. He had made up his mind that the very presence of the Jesuits in Portugal was incompatible with the security of the government and the welfare of the nation, and by a royal decree 1759, Sep. 3, they were banished from the kingdom as rebels and enemies to the king. When they refused to leave, P. had them violently removed by soldiers, carried on board ships, and transported to the States of the Church. The pope, Clement XIII., vehemently protested, whereupon P. caused the papal nuncio to be shown across the frontier. Shortly afterward, Clement XIII. died, and was succeeded in the papal see by Clement XIV.—no friend of the Jesuits, in consequence of which the differences between Portugal and the Vatican were soon made up. All this time P. was laboring energetically to improve the cultivation of the land and the system of education. In 1770 he was created Marquis of P., and from this period to the death of the king 1777, he was at the height of his greatness. The accession of Joseph's daughter, Maria I.—an enemy of the minister—was immediately marked by his downfall. He was deprived of his offices; the conspirators whom he kept in prison were released; many of his institutions were abolished; and he himself was saved from the scaffold only because he held in his possession documentary proofs of the former treason of his now triumphant enemies. Maria ordered him to retire to his castle of Pombal, where he died. The peasantry always spoke of him as 'The Great Marquis,' and history has stamped the rustic verdict with its approval. When he was turned out of office, he left the queen a public purse containing 78,000,000 cruzados, and a well-ordered and flourishing state.

POME, n. *pōm* [F. *pomme*—from L. *pomum*, an apple]: in *bot.*, a fleshy many-celled fruit, as the apple, pear, and other fruits of the *Pomaceæ;* and in which the *epicarp* and *mesocarp* (see FRUIT) form a thick fleshy mass; while the *endocarp* is scaly, horny, or stony, and divided into separate cells, in which the seeds are inclosed. The fruit is crowned with remains of the calycine segments. Pomes have 1–5 cells, or spuriously 10 cells. POMME, n. *pŭm*, or POMMETTE, n. *pŭm-mĕt'*, in *her.*, a device, or some part of it, resembling an apple. POMACE, n. *pŭm'ās*, apples crushed by grinding; the refuse of cider-pressings. POMMAGE, n. *pŭm'mĭj*, another spelling of *pomace.* POMACEOUS, a. *pō-mā'shŭs*, consisting of apples; resembling apples or relating to them.

POMECITRON, n. *pōm-sĭt'rŭn* [F. *pomme*, an apple, and Eng. *citron*]: a citron apple.

POMEGRANATE, n. *pŏm'grăn-āt* [L. *pomum*, an apple; *granātus*, having many grains or seeds: It. *pomogranato*], (*Punica granatum*): showy tree producing splendid flowers and fruit: also its fruit, indehiscent, pulpy, containing many seeds. The P. is much cultivated in warm countries, and is apparently a native of warmer temperate parts of Asia, perhaps also of n. Africa. It has been cultivated in Asia from most ancient times, and is mentioned frequently in the Old Test. On the robe and ephod of the Jewish high-priest were ornaments resembling the fruit. It has long been naturalized in s. Europe. In a wild state, the plant is a thorny bush, in cultivation it is a low tree, with twiggy branches, flowers at the extremities of the branches, the calyx red, the petals scarlet. It is generally referred to nat. order *Myrtaceæ.* The calyx is leathery, tubular, 5–7-cleft; there are 5–7 crumpled



Section of a Pomegranate.

petals; the fruit is as large as a large orange, with thick leathery rind of fine golden yellow, with a rosy tinge on one side, not bursting when ripe; the cells filled with numerous seeds, each of which is surrounded with pulp, and separately inclosed in a thin membrane, so that the P. appears to be formed of a great number of reddish berries

packed together and compressed into irregular angular forms. The pulp is sweet, sometimes subacid, and of pleasant delicate flavor, very cooling, and grateful, particularly in warm climates. It is often used for preparation of cooling drinks. A kind of P. without seeds is cultivated and much prized in India and Persia. Pomegranates have long been imported in small quantities into Britain and the United States from Portugal and n. Africa; but have never become an article of general demand and commercial importance like oranges. There is an ornamental variety of the P. with double flowers. The rind of the fruit is very astringent, and a decoction is used as a gargle in relaxed sore throat, and as a medicine in diarrhea, dysentery, etc. Deriving its astringency from tannin, it is used to tan leather: the finest Morocco leather is said to be tanned with it, and small quantities are exported from n. Africa, under the name *Pomegranate Bark*, for preparation of the finest kinds of leather.—The bark of the roots is used as an anthelmintic, and is often successfully administered in cases of tape-worm. Its value was known to the ancients, and it has long been in use in India.—The P. tree is occasionally cultivated in northern temperate countries in hothouses, and even in the open air, and is very ornamental; but the fruit is worthless. In parts of s. Europe it is used as a hedge plant.

POMEL, n. *pŭm'ĕl* [see POMMEL 1]: in *arch.*, a ball or boss, or round ornament used as a finial on a pointed roof, turret, etc.

POMERANIA, *pŏm-ė-rā'nĭ-a* (Ger. *Pommern*): province of Prussia, bounded n. by the Baltic, e. by W. Prussia, s. by Brandenburg, w. by the Mecklenburg duchies; 11,600 sq. m. Pop. (1900) 1,634,832. P. is divided into three governmental districts, Stettin, Stralsund, and Köslin.

This province, one of the lowest and flattest in Germany, with few hills of even moderate height, is intersected by the Oder (q.v.), which forms numerous lakes and ponds, the largest of which is the Dammer Lake. The waters of this lake and of the Oder are then carried into the Stettiner Haff, from which three outlets—those of the Peene, Swine, and Dievenow—lead into the Baltic. Between these three outlets are the two islands Usedom and Wollin. After the Oder, the chief rivers are the Ihna, Rega, Persante, Wipper, and Stolpe. The shores in parts are protected by dikes and sand-banks. The soil is generally sandy, and in many districts even stony; though near Pyritz and Stargard, on the Ploen and Maduc lakes, and at points of the sea-coast, it is moderately fruitful, yielding good crops of wheat, and affording rich pasture. About half of the whole area is cultivated; about a sixth is uncultivated, or under water; and the remainder is in pastures, heath, and wood. The chief vegetable products, most of which are grown in sufficient quantities to be largely exported, are —rye, wheat, and other grain, flax, hemp, tobacco, and timber. Among exports of P. are horses, cattle, sheep, swine, geese of superior quality, feathers, butter, wool,

hams, sausages, smoked poultry, etc. The sturgeon and salmon fisheries are very productive, and P. is noted for admirable lampreys, eels, and cray-fish, which are largely exported in a pickled state. The mineral products are inconsiderable; they include bog-iron, lime, marl, alum, salt, amber found on the coast near Stolpe; also peat, obtained in enormous quantities, and extensively used for fuel, notwithstanding the abundant supply of wood from the extensive forests.

Linen and woolen fabrics, and leather, rank among the best industrial products; but the manufactures of P. are not important. The principal branches of industry are agriculture and rearing of horses and cattle; while the active transport trade between the neighboring Prussian states and the Baltic ports is a very important source of wealth. The main seat of Pomeranian trade is at Stettin (q.v.), one of the most important commercial cities of Prussia.

P., like every other part of the Prussian dominions, is well provided with educational institutions, and, besides the univ. at Greifswald, it has 13 gymnasia, several normal and training schools, and numerous classical and other schools.

P. formed, in its earliest history, a part of the anc. kingdom of the Wends or Vandals. From 1062 it had its own ducal rulers, and in the beginning of the 12th c. it adopted Christianity in consequence of the preaching of Bp. Otto of Bamberg. Bogislaus XIV., who died 1637, was the last male representative of the Wendish ducal line; and, on his death, the House of Brandenburg laid claim to the whole of the Pomeranian territories, in conformity with a compact asserted to have been made between that family and the Wendish dukes; but the country having been occupied by the Swedes during the Thirty Years' War, Prussia was obliged to content itself with the possession of Further P., or *Hinterpommern*, which was assigned to it at the Peace of Westphalia, while Sweden retained the remainder of P., with the island of Rugen (q.v.). After the death of Charles XII., and the subsequent decline of the Swedish power, Prussia was able to make good her asserted claims on the territory of P. at the Peace of Stockholm; and 1720 Sweden was compelled to cede Southern P. and the island of Rugen, retaining only a narrow strip of land between Mecklenburg and the Baltic, which also was incorporated with Prussia 1815, after having been first transferred by Sweden to Denmark as part indemnification for the separation from the latter kingdom of Norway, and subsequently ceded to Prussia by the Danes in exchange for the duchy of Lauenburg, and on the payment of 2½ million thalers to the latter, and of 3½ million thalers to the Swedish government.

POMERA'NUS, or DR. POM'MER: see BUGENHAGEN.

POMEROY, *pŭm'ė-roy:* city, cap. Meigs co., Ohio, on the Columbus Hocking Valley and Toledo railroad, and the Ohio river, 66 m. from Parkersburg, 133 m. from Columbus, 239 m. from Pittsburgh. There are nine churches, good schools, two weekly newspapers, a national bank (cap. $50,000) and a private bank. The manufactures include flour, salt, and woolen goods, and there are iron works of some extent. Large quantities of bituminous coal are mined in the vicinity. There is considerable trade with other towns lying on the river. The village was incorp. 1841 and the city 1868. Pop. about 5,000.

POM'EROY: John Norton, ll.d: professor of law and writer: 1828, Apr. 12—1885, Feb. 15; b. Rochester, N. Y. He was graduated at Hamilton Coll. 1847; began the practice of law 1851; was prof. of law and lecturer on polit. science in the Univ. of the City of New York 1864–69; and prof. of law in the Univ. of Cal. 1878 until his death at San Francisco. He published *Introduction to Municipal Law* (1865); *Introduction to Constitutional Law of the United States* (1868); annotated edition of *Sedgwick's Statutory and Constitutional Law* (1874); *Remedies and Remedial Rights according to the Reformed Amer. Procedure* (1876); *Treatise on the Specific Performance of Contract* (1879); *Treatise on Equity Jurisprudence* (1883); *Treatise on Riparian Rights* (1884). He was also a contributor to the *Nation*, the *N. Amer. Review*, and law periodicals. His work on constitutional law has been used as a text-book in colleges.

POMEROY, n. *pŭm-roy'*, or Pomeroy'al, n. *-roy'ăl* [F. *pomme*, an apple; *roi*, a king]: a particular variety of apple.

POM'EROY, Seth: revolutionary patriot: 1706, May 20—1777, Feb. 19; b. Northampton, Mass. A gunsmith by trade, his skill was serviceable at the capture of Louisburg 1745 in refitting spiked cannon. He then held the rank of major; was promoted to lieut.col.; and commanded at the defeat of Dieskau's French and Indians. He was a member of the provincial cong. 1774-5, which appointed him brig.gen. 1775. With musket he hastened to Bunker Hill after the battle was begun, and showed great bravery. Soon after this, a dispute arising in regard to his appointment as senior brig.gen., he retired from active service; but he raised a force to relieve Gen. Washington in N. J. 1776, and died on the way at Peekskill, N. Y.

POMEWATER, n. *pōm'waw-tėr* [*pome*, and *water*]: in *OE.*, a kind of apple.

POMEY, n. *pŏm'ĭ* [F. *pommé*, grown round or to a ball, like an apple]: in *her.*, the figure of an apple or of a roundel; it is always of green color.

POMIFEROUS, a. *pō-mĭf'ėr-ŭs* [L. *pomum*, an apple; *fero*, I produce]: apple-bearing; applied to the plants that yield the larger fruits.

POMIGLIANO D'ARCO, *pō-mēl-yâ'nō dâr'kō:* town in the province of Naples, Italy, circumscription of Casoria, about 7 m. n.e. of Naples; pop. (1881) 8,252. It has two very handsome churches, and a hospital; also ruins, among them some arches (hence the name of the place, Pomigliano *of the arch*) of an ancient aqueduct. The principal industry is polishing of gems.

POMMEL, n. *pŭm'mĕl* [F. *pommeau*, a knob: It. *pomo*, an apple, a pommel—from L. *pomum*]: a knob; any globular ornament; the knob on a sword-hilt; the protuberant part of a saddle-bow.

POMMEL, v., or PUMMEL, v. *pŭm'mĕl* [Bav. *pumsen*, to sound hollow, to beat: Lang. *poumpi*, to beat, to knock: W. *pompio*, to thump, bang—the root *pum* being used to signify striking, from direct imitation of the sound of a blow (see also BUMP)]: to beat: to beat roughly. POM'MELLING, imp.: N. a beating; a thumping; a bruising. POM'MELLED, pp. *-mĕld.*

POMMETTY *pŏm'ĕ-tĭ*, or POMEL CROSS, *pŏm'ĕl*, in Heraldry: cross whose extremities terminate in single knobs or pomels, like the *Bourdon* or pilgrim's staff.

Pommetty Cross.

POMOLOGY, n. *pō-mŏl'ŏ-jĭ* [L. *pomum*, an apple, a fruit; Gr. *logos*, a discourse]: art or science of rearing fruit; a treatise on fruits —particularly of nat. order *Pomaceæ* (q.v.): see FRUIT: ORCHARD. POMOLOGICAL, a. *pō'mō-lŏj'ĭ-kăl*, pertaining to pomology. POMOLOGIST, n. *pō-mŏl'ŏ-jĭst*, one who is skilled in pomology.

POMONA, *pō-mō'na* [name obviously connected with *pomum*, a fruit]: among the anc. Latins, the patron divinity of tree-fruits. The poets, not, perhaps, without some allegorical design, represent several of the rural gods as her lovers—Silvanus, Picus, Vertumnus, etc. Of Vertumnus, god of the turning year, in particular, it is related that after he had vainly tried to approach her under a thousand different forms, he at last succeeded by assuming the figure of an old woman. In this guise, he recounted to her the lamentable histories of women who had despised love, and having touched her heart, suddenly transformed himself into a blooming youth and married her. But Vertumnus (connected with *verto*, 'I turn,' or 'I transform') is probably nothing more than a personification of those changes by which plants advance from blossom to fruit. The worship of P., as was natural among a homely race of farmers and shepherds like the ancient Latins, was of considerable importance. Varro tells us that at Rome her services were under the care of a special priest, the *flamen Pomonalis*. In works of art she was generally represented with fruits in her lap, or in a basket, with a garland of fruits in her hair, and a pruning-knife in her right hand.

POMONA, *pō-mō'na*, or MAIN'LAND: much the largest and most populous of the Orkney Islands (q.v.), in which group it is central. It is open to the Atlantic on the w., and to the German Ocean on the e., while on the n. Enhallow and Shapinsha sounds separate it from the islands of Ronsay and Shapinsha, and on the s., Scapa Flow separates it from Hoy and South Ronaldsha: 25 m. long, 15 m. in extreme width, but very irregular in shape; 150 sq. m. At the town of Kirkwall, the breadth is only about two m. In the w., the shores are bold and elevated, but there is a general slope toward the e. The surface is diversified, and consists in great part of moor and heath, with some good pastures, and in the valleys a fertile, loamy soil. Oats, beans, and bere are produced, and sheep and swine are extensively reared. The chief towns are Kirkwall (q.v.) and Stromness (q.v.). Pop. of island (1891) 16,498.

POMP, n. *pŏmp* [F. *pompe*, pomp, splendor—from L. *pompa:* Gr. *pompē*, a solemn procession—from *pempō*, I send: It. *pompa*]: exterior show; ostentation; display; parade; a splendid ceremony; in *OE.*, a splendid procession. POMPOUS, a. *pŏm'pŭs*, showy; splendid; characterized by ostentation and boastful display. POM'POUSLY, ad. *-lĭ*. POM'POUSNESS, n. *-nĕs*, or POMPOSITY, n. *pŏm pŏs'ĭ-tĭ*, the state of being pompous; ostentation; magnificence of display; showiness; boastfulness.—SYN. of 'pomp': parade; display; ostentation; grandeur; pride; pageant; pageantry; splendor; state; magnificence; show; —of 'pompous': superb; august; stately; dignified; ostentatious; lofty; boastful; magisterial; grand; splendid; showy; swelling.

POMPADOUR, n. *pŏm'pa-dôr:* style of head-dress for women about the middle of the 18th c., so called after Madame Pompadour; later, a style of dressing the hair by rolling it off from the forehead over a sort of cushion.

POMPADOUR, *pŏng-pâ-dôr'*, JEANNE ANTOINETTE POISSON LE NORMANT D'ETIOLES, Marquise DE: notable mistress of Louis XV.: 1721, Dec. 29—1764, Apr. 15; b. Paris. Her reputed father was François Poisson, who had an office in the household of the Duke of Orleans; but M. le Normant de Tournehem, a rich *fermier-général*, was suspected of being her father, and actually assumed the cost of her education. She turned out a wonderfully clever child, and M. le Normant spared no pains to give her the best, at least, the most stylish education, giving her to understand that she was a 'morsel for a king.' She excelled in such accomplishments as music, elocution, and drawing; but what charmed the brilliant society that frequented the *salons* of the rich financier, was the perfect grace and beauty of her figure, and the exquisite art with which she dressed. A crowd of suitors constantly besieged her, but the one who obtained her hand was her guardian's nephew, Le Normant d'Etioles, whom she married 1741. But Madame d'Etioles was careless of her husband's honor and of his ardent love; and cold, heartless, and ambitious, she was scheming day and night to attract the notice of the

monarch. Her efforts, long in vain—for there was no communication between the society of financiers in which she shone, and the court circle—were at last successful; she gained the king's notice on one of his hunting parties, and as the result, Madame d'Etioles was installed in the palace of Versailles. She was soon afterward ennobled by the title Marquise de P., and long ruled the king, first as mistress, and, when after a year or two he had grown indifferent, as *amie nécessaire*. One reads with astonishment of her incessant artifices to preserve her influence—the everlasting huntings, concerts, private theatricals, little suppers, and what not—anything to distract the royal mind (surely sufficiently distracted already by nature), and to keep him mindful of the clever purveyor of gayeties! The private theatricals, in particular, were a great success, and were 'got up' every winter from 1747 to 53—the marquise herself being a charming actress. The king thought the marquise extremely clever, and, when he ceased to 'love' her, was glad to avail himself of the services of this strong and brilliant woman as his political adviser. In fact, she became premier of France; the council of ministers assembled in her boudoir, where the most important affairs of state were settled. The choice of ministers, of ambassadors, of generals, depended on a woman's caprice; the Abbé de Bernis, the favorite of a favorite, entered the council. Foreign diplomacy turned the circumstance to account. The Austrian prime-minister induced Maria Theresa to sacrifice her pride to the exigencies of her position, and the empress-queen wrote the courtesan a letter in which she addressed her as *ma cousine*. That word turned the head of the marquise, and changed for a time the foreign policy of France, which had long been anti-Austrian. She died with the reins of government in her hands, sinking gradually into weakness under the tremendous and incessant strain. During her life-time, immense sums from the national treasury were lavished on the marquise, and on her brother, created Marquis de Marigny: in the years 1762, 3 alone they amounted to 3,456,000 livres (more than $650,000). She had numerous houses and lands also given her. In 1853 M. le Roi, keeper of the town-library of Versailles, published in the *Journal de l'Instruction Publique*, a list of the expenses of the Marquise de P. during her years of royal favor, which he had found in MS. in the archives of the dept. of Seine-et-Oise. They amounted to 36,000,000 livres (not far from $7,000,000). She was imperious and vindictive beyond measure, and with relentless cruelty doomed to perpetual imprisonment, in the dungeons of the Bastile and elsewhere, multitudes who had dared to question her ill-gotten gains and power. In view of facts like these, it is but a poor apology for the marquise to adduce the fact that she encouraged savants, poets, and philosophers—notable among whom was Voltaire—patronized and protected the *Encyclopédie*, and aided in the expulsion of the Jesuits. The *Lettres* in her name are mostly spurious. See the *Life* by Goncourt (new ed. 1878)

POMPEII.

POMPEII, *pŏm-pā'yē:* anciently a city of Campania, at the mouth of the river Sarnus (*Sarno*), looking out on the Bay of Naples. It stood at the base of Mount Vesuvius, between Herculaneum and Stabiæ. Of its early history little is known (legend ascribed its foundation to Hercules); but in more recent times it became a favorite resort for wealthy Romans, many of whom, including Cicero, had villas in the suburbs. It must have been at one time a place of considerable trade, since it was the port-town of Nola and other inland cities which studded the fertile valley of the Sarnus. The city was much damaged by an earthquake, A.D. 63, Feb. 5; and not many years later the great and final calamity overtook it. In 79 a terrific eruption of Vesuvius in one day overwhelmed in irremediable ruin the towns of P., Herculaneum, and Stabiæ. In course of time a small village rose at or near the spot; but by and by the memory of P. was forgotten, and for centuries its very site was unknown. The difficulty of discovering its true position was increased by the changes produced by this fearful convulsion, which had hurled back the Sarnus from its former course, and raised the sea-beach to a considerable height, so that the rediscovered city, to which merchantmen resorted of old, is now a mile from the coast, and a considerable distance from the stream that in ancient times skirted its walls. For more than 1,600 years P. lay undisturbed beneath heaps of ashes and cinders. At length, 1689, some ruins were noticed, but not till 1755 were any excavations made. These operations, begun by the Neapolitan govt., have been continued till the present time (recently with increased energy), and have been exceedingly productive of objects which interest the antiquarian and the classical scholar. The remains found are in remarkably good preservation, owing to the fact that the city was destroyed not by lava, but by showers of sand, ashes, and cinders (*lapilli*), forming a light covering, which found its way into every nook, and, as it were, hermetically sealed up the town. It would appear that in some parts at least the matter was deposited in a state of liquid mud, and so flowed into the remotest cellars of the doomed habitations. This is proved by the discovery of the skeleton of a woman 'inclosed in a mold of volcanic paste, which retained a perfect impression of her form.' It suggested to Signor Fiorelli, director of the excavations, the idea of filling up the molds with liquid plaster, and obtaining casts of the forms that they had contained. Among recent excavations are several paintings of classical subjects, one of which, the Laocoön, excavated 1875, is a most valuable specimen of ancient art. That the superincumbent rubbish, in most places about 15 ft. deep, is the accumulation of several eruptions is proved by the facts: that as many as eight or nine different layers have been distinctly counted; and that, while the upper layers are undisturbed, the lower one has evidently been moved. The comparatively few skeletons found, and the almost entire absence of objects of great value, as gold and silver plate, show that most of the inhabitants (estimated at 20,000) escaped and returned to

A STREET IN POMPEII.

bury their dead, and recover their treasures. In the autumn of 1864, more than 200 skeletons were found in a temple of Juno, the victims having evidently gone thither to seek the protection of the goddess. Only about one-third of the city has as yet been excavated. The plan of P. seems to have been regular, the narrow streets crossing one another at right angles. The houses were plain and seldom more than two stories high, and had all their good apartments on the ground-floor. The walls are about two m. in circumference. In all the departments of social life—in the affairs of domestic and of public life, of the worship of the gods and the shows of the arena—in architecture, painting, and sculpture—in fine, in all the appliances of comfort and of luxury in a wealthy community, we have in this exhumed city the reproduction of a city of 1,800 years ago. See further: Mazois's work, *Les Ruines de Pompeii* (Paris 1812–38); Breton's *Pompeia* (Paris 1855); Overbeck's *Pompeji* (3d ed. 1875); Gell's *Pompeiana* (4 vols. 1824–30); *Something of Italy*, by W. Chambers (1862); and *Pompeii*, by T. H. Dyer (1875). In connection with the commemoration of the 18th centenary of the destruction of the city, a volume was issued 1879 by the directorate of the Museum of Naples, treating of every aspect of the public and private life of the people of Pompeii.

POMPELMOUS, *pŏm'pĕl-mŭs*, or POM'PELMOOSE, *-môs*, or POMELO, *pŏm'ĕ-lō* (*Citrus pompelmoos*): fruit nearly resembling the Shaddock (q.v.), of which, perhaps, it ought to be classed as a variety, though it is now distinguished by some botanists as a separate species. The common name in New York is Grape Fruit, when not confounded with the Shaddock. It is large and pale yellow, though smaller than the Shaddock proper. It has long been cultivated in the E. Indies, and has recently been introduced into many warm countries. It has become an article of importation. In pleasantness of taste, it resembles the best oranges. It is often preserved with wine and sugar, when it is very agreeable and refreshing in a hot climate. The rind is often candied.

POMPET, n. *pŏm pĕt* [OF. *pompette*]: old name of a printer's ball for spreading the ink on the types

POMPEY.

POMPEY, *pŏm'pĭ*, THE GREAT (CNEIUS POMPEIUS MAGNUS): Roman triumvir and soldier: B.C. 106–48; son of Cneius Pompeius Strabo. At the age of 17 he began to learn the military art under his father by service in the field against the Italians in the Social War, and gave proof of extraordinary valor and energy. On the death of his father, B.C. 87, when he was only 19 years of age, he was left without a protector, and during the temporary triumph of the Marian party he was in considerable danger. When Sulla, to whose side he was attached, returned from Greece to Italy to oppose Marius, P. hastened into Picenum, where he had considerable estates and influence, and there raised an army of three legions, with which, after successfully opposing the forces of the Marian party, he compelled them to quit the district, and effected a junction with Sulla. During the rest of the war he behaved with great prudence and valor, and with such remarkable success, that, on restoration of peace in Italy, the conduct of the war against the remains of the Marian faction in Africa and Sicily was intrusted to him. He speedily performed his commission, and on his return to Rome was honored with the name MAGNUS (i.e., 'The Great'), and with a triumph, which, for one who had not yet held any public office, and was merely an *eques*, was an unprecedented distinction. His next exploits were the reduction of the followers of Lepidus, whom he drove out of Italy, and the extinction of the Marian party in Spain, led by the brave Sertorius. This latter work was difficult. P. suffered some severe defeats at the hands of Sertorius, and it was only after Sertorius had been assassinated that he was able to put an end to the war. Returning to Italy after an absence of five or six years in Spain, he met and defeated the remnants of the army of Spartacus, and thus claimed the credit of concluding the Servile War. He was now the idol of the people, and though legally ineligible to the consulship, was elected to that important office for the year B.C. 70, the senate relieving him of his disabilities rather than provoke him to extremities. Hitherto P. had belonged to the aristocratic party, but as he had of late years been viewed with suspicion by some of the leading men, he publicly espoused the people's cause. He carried a law restoring the tribunician power to the people; and aided largely in introducing the bill of Aurelius Cotta (*Lex Aurelia*), that the *judices* should for the future be taken from the *senate*, the *equites*, and the *tribuni aerarii*, instead of from the senate alone. B.C. 67–66 P. performed a noble service to the republic in clearing the Mediterranean of the pirates who infested it in immense numbers; and during the next four years, 65–62, he conquered Mithridates, King of Pontus, Tigranes, King of Armenia, and Antiochus, King of Syria. At the same time he subdued the Jewish nation, and captured Jerusalem. On his return to Italy he disbanded his army, and entered Rome in triumph for the third time B.C. 61. And now his star began to dim. Henceforward we find him distrusted by the aristocracy, and second to Cæsar in popular favor. After his return, he was anxious that his acts in

Asia should be ratified by the senate, and certain lands apportioned among his veteran soldiers. But the senate declined to accede to his wish, and he therefore formed a close intimacy with Cæsar, who promised to secure for him the accomplishment of his objects, if he in turn would assist Cæsar in attainment of *his* aims. Crassus, who possessed enormous wealth, and therefore exercised wide influence at Rome, was induced to forego his grudge to P. and thus these three men formed among themselves that coalition which is commonly called 'the First Triumvirate,' and which for a time frustrated all the efforts of the aristocratic party. This small oligarchy carried all before them; P.'s acts in Asia were ratified; Cæsar's designs all were gained; his agrarian law, distributing land in Campania among the poorer citizens was passed; and thus, too, P.'s promises to his troops were fulfilled. Cæsar's daughter, Julia, was given in marriage to P., and private relationship was thus made to bind tighter the tie of political interest. And now, for years following, Cæsar was reaping laurels in Gaul, and rising higher in popular esteem as warrior and statesman, while P. was idly wasting his time and his energies at Rome. But P. could not bear a rival. Jealousies sprang up; Julia died B.C. 54, and thus father-in-law and son-in-law were sundered by a wider gulf which no bridge could span. P. now returned to his former friends, the aristocracy, whose great desire was to check Cæsar's views, and strip him of his command. Cæsar was ordered to lay down his office and return to Rome, which he consented to do, provided P., who had an army near Rome, would do the same. The senate insisted on an unconditional resignation, and ordered him to disband his army by a certain day, otherwise he would be declared a public enemy To this resolution two of the tribunes in vain objected; they therefore left the city and cast themselves on Cæsar for protection. It was on this memorable occasion that he crossed the Rubicon, and thus defied the senate and its armies, which were under P's. command. For the events of the civil war which followed, see CÆSAR. It remains only to mention, that after being finally defeated at Pharsalia B.C 48, P. escaped to Egypt, where, according to the order of the king's ministers, he was treacherously murdered by a former centurion of his own, as he was landing from the boat. His head was cut off, and afterward presented to Cæsar on his arrival in Egypt. But Cæsar was too magnanimous to delight in such a sight. The murderer of P. was, by his orders, put to death. The body lay on the beach for some time, but was at length buried by a freedman, Philippus, who had accompanied his master to the shore. Pompey was a remarkably successful soldier, but left no sign of statesmanship. In private he had estimable qualities: in that corrupt capital his domestic life was pure; and though often wielding vast power he never used it for extortion.—His second son, SEXTUS POMPEIUS (B.C. 75–35), prolonged the contest with the new rulers of Rome. He received a large sum of money from the public treasury in compensation for the confiscation of his father's estate·

marched southward and assumed the style of a sovereign. Proscribed by the second triumvirate, he escaped into Spain, gathered a fleet, made himself master of Sicily, and by his ships cut off the supplies of food for Rome. After a Roman squadron under Agrippa had destroyed his fleet, he was put to death.

POM'PEY'S PILLAR: famous column standing in the neighborhood of Alexandria, upon an eminence about 1,800 ft. s. of the walls. It is a monolith of red granite, of the Corinthian order, stands upon a pedestal; total height 98 feet, 9 inches; shaft, 73 feet; 29 feet, 8 inches in circumference. The shaft is well executed. On the summit is a circular depression for the base of a statue, which in some old drawings is represented standing on it. The name P. P. is an erroneous appellation given by ancient travellers, who confess they do not know whence the name was derived. The inscription on the base shows that it was erected by Publius, prefect of Egypt, in honor of Emperor Diocletian, who is styled upon it 'the invincible;' and it is supposed to record the conquest of Alexandria by Diocletian, 296, and the suppression of the rebellion of the pretender Achilleus. It appears to have been in the vicinity of a circus, forum, or gymnasium The obelisk stood on some fragments of Egyptian monuments of remote antiquity, consisting of a piece with the name of a monarch of the 13th Egyptian dynasty, and another with that of Psammetichus I., the former of which is now in the British Museum.—Wilkinson's *Modern Egypt*, I. 149 and foll.; White, *Ægyptiaca* 1, and foll.; Champollion-Figeac, *L'Egypte*, 472; Norden, I. 22.

POMPHOLYX, n. *pŏm'fō-lĭks* [Gr. *pompholux*, a bubble or blister]: flowers of zinc; an eruptive skin-disease.

POMPION, n. *pŏm'pĭ-ŏn* [F. *pompon*, a melon]: a pumpkin; the *Cucur'bĭta pepo*, ord. *Cucur'bĭtăcĕæ*.

POMPIRE, n. *pŏm'pīr* [L. *pomum*, an apple or similar fruit; *pĭrum*, a pear]: an apple; a sort of pearmain.

POMPO'NIUS ME'LA: see MELA.

POMPOSO, ad. *pŏm-pō'sō* [It.]: in *music*, grandly: ADJ. dignified.

POMPOUS, POMPOSITY, etc.: see under POMP.

PONANI, *pō-nâ'nĭ*, or PANIANI, *pâ-nĭ-â'nĭ:* seaport town of Brit. India in the dist. of Malabar, about 600 m. s.e. from Bombay. The people are employed in fishing and in trade. Pop. 12,000.

PONCAS, *pŏn'kaz:* tribe of N. American Indians, remotely of the Omaha family, more recently of the Dakota. When first known to the whites they lived on the Red river of the north, whence they removed to Mo., and settled on the Ponca river after being defeated by the Sioux. In 1858 they sold their land between Iowa creek and White Earth river to the govt.; in 1865 they received by treaty a reservation of 576,000 acres near the junction of the Missouri and Niobrara rivers in Knox co., Neb.; and subsequently a portion was removed to the part of Indian

Terr. now organized as Oklahoma Terr. Their agencies are under the spiritual care of the Prot. Episc. Church. In 1890 there were 296 males and 309 females (total 605) on the Oklahoma reservation, and 105 males and 112 females (total 217) in Neb.; total, 822.

PONCE, *pōn'thā:* city in Porto Rico, the second in size, situated a mile from the s. coast of the island. It is connected with its port, a bay, by a tramway. It has a bank, a good water supply, and an active trade, especially in coffee. It was founded in 1620. In 1898, July, it surrendered to the U. S. forces. Pop. (1899) 27,952.

PONCE DE LEON, *pōn'thā dā lā-ōn',* JUAN: Spanish adventurer: 1460–1521; b. Leon, Spain. After brave service in the Moorish wars, he took part in the second voyage of Columbus, 1493, and was made gov. of a province of Hispaniola. In 1509 he conquered Porto Rico, and became gov. there, but was superseded on account of his severity. Led by a hope of finding the fountain of youth, he discovered Florida 1513, and named it either in honor of the 'flowery Easter,' the day of his landing, or because it is a flowery land. This landing was near the present St. Augustine. He returned to Spain, was made gov. of Fla., which he colonized 1521; but, wounded in battle with the Indians, he retired to Cuba, where he died.

PON'CE DE LEON', Fray LUIS: Spanish poet: about 1528–1591, Aug. 23; b. probably at Granada. In 1544 he entered the order of St. Augustine at Salamanca, where he studied, took his degree in theol. 1560, and was appointed prof. of theol. 1561. He was accused to the Inquisition 1572 of disregarding the prohibition of the church; as he had made a new translation of the Song of Solomon, and brought out prominently, in his arrangement of the verses, the true character of the original—viz., that of a pastoral eclogue—an interpretation not adopted by the church. The charge of Lutheranism, also brought, he quickly disposed of—for he had in reality no inclination to a foreign Protestantism; but the charge as to his unauthorized translation was true, and P. was imprisoned for 5 years. In 1580 P. published a Latin commentary on the Song of Solomon. P. lived 14 years after restoration to liberty, but his terror of the Inquisition never quite left him, and he was very cautious in his public utterances. P.'s poetical reputation was wholly posthumous, for though his *De los Nombros de Christo* (on the Names of Christ), (Salamanca 1583–85), and *La Perfecta Casada* (The Perfect Wife), (Salamanca 1583), are full of imagery, eloquence, and enthusiasm, yet they are in prose. His poetical remains, published first by Quevedo at Madrid 1631, and often reprinted, consist of translations from Virgil's *Eclogues* and the *Georgics;* from the *Odes* of Horace, and other classical authors, and from the Psalms. His original poems are few, but they are considered among the most precious in the author's language, and have given P. a foremost place

among Spanish lyrists. According to Ticknor: 'Luis de Léon had the soul of a Hebrew, and his enthusiasm was almost always kindled by the reading of the Old Testament. Nevertheless, he preserved unaltered the national character. His best compositions are odes composed in the old Castilian versification, with a classic purity and a vigorous finish that Spanish poetry had never till then known, and to which it has with difficulty attained since.'

PONCELET, *pôns-lā,* JEAN VICTOR: French military engineer: b. Metz, 1788, July 1; d. Paris, 1867, Dec. 23. Between the years 1807 and 1810 he attended the Ecole Polytechnique, where he was a pupil of Monge. In 1812 he received the commission of lieutenant in the engineers, but on Napoleon's retreat from Moscow was taken prisoner and transported to Saratov, on the Volga. On returning to Metz in 1814 he worked on his geometrical problems and in 1829 published his *Traité des Proprietés Projectives des Figurcs.* He henceforth gave himself closely to the study of applied mechanics; invented the water wheel which bears his name, and published numerous works on mechanics. In 1835 he was appointed member of the National Defenses Commission and professor of applied mechanics in the University of Paris. He was promoted general in 1848 and went to the Exhibition of 1851 at London as president of the Commission of Mechanics. In 1857 he published his important account of the progress of mechanical science, *Collection des Travaux de la Commission Française.* The work which he had begun in captivity in Saratov—*Application d'Analyse et de Géometrie*—he published in 1862. He was really the founder of modern geometry. Among his other works are: *Les Roues Hydrauliques Verticales* (1826); *Experiences Hydrauliques* (1832); *Traité de Mécanique Appliquée aux Machines* (1845); etc. Consult: Didion, *Notice sur la Vie et les Ouvrages du Général Poncelet* (1869).

PONCHO, n. *pŏn'chō* [Sp.]: form of cloak worn by Sp. Americans, being merely a blanket or length of woolen cloth, 5-7 ft. long, 3-4 ft. broad, having in the middle a slit through which the wearer passes his head, so that the poncho rests upon the shoulders and hangs down before and behind.

POND, n. *pŏnd* [AS. *pyndan,* to shut in: comp. Ger. *spund;* F. *bondon,* a bung, a stopper, and thence the thing stopped up]: a piece of water penned or dammed up; a small piece of still water, generally artificial.

POND, *pŏnd,* ENOCH, D.D.: theologian and author: 1791, July 29—1882, Jan. 21; b. Wrentham, Mass. He graduated at Brown Univ. 1813; studied theology with the noted Dr. Emmons; was pastor at Auburn, Mass.; editor of *The Spirit of the Pilgrims* 1815-28; elected professor of theology and lecturer on pastoral duty at Bangor Theol. Seminary 1832; and made emeritus pro-

fessor 1870, but acting as president until his death, which occurred at Bangor. His writings were very numerous; the most widely circulated were *Christian Baptism* (1817); *Morning of the Reformation* (1842); *No Fellowship with Romanism* (1844); *Review of Second Advent Publications* (1844); *The Young Pastor's Guide* (1844); *The World's Salvation* (1845); *Probation* (1846); *Swedenborgianism Reviewed* (1846, *the same Examined* 1861); *The Church* (1848); *Review of Bushnell's God in Christ* (1848); *The Ancient Church* (1851); *Prize Essay on Congregationalism* (1867).

POND, Frederick Eugene ('Will Wildwood'): American author and journalist: b. Packwaukee, Wis., 1856, April 8. He was educated at Montello, Wis., and early turned to journalism, in which he made sporting matters his specialty, and was one of the first to urge the establishment of a National Sportsman's Association. In 1881-6 he was field editor of *Turf, Field, and Farm*, edited *Wildwood's Magazine* in 1888-9, and when it was merged with *Turf, Field, and Farm*, he became corresponding editor. Since 1897 he has edited the *Sportsman's Review*. He has published: *Handbook for Young Sportsmen* (1876); *Gun Trial and Field Records of America* (1885); *A Strike* (1897); edited Frank Forester's works (1879); etc.

POND, James Burton: American lecture manager: b. Cuba, Allegany County, N. Y., 1838, June 11; d. Jersey City, N. J., 1903, June 21. He edited the *Weekly Journal* of Markesan, Wis., 1860-1, and becoming 2d lieutenant in the 3d Cavalry Volunteers of that State, rose to the rank of major, and was among the 17 survivors of the guerrilla Quantrell's massacre of a band of 118 soldiers at Baxter Springs, Kan., in October, 1863. He managed the lecture tour of the 19th wife of Brigham Young, and for the rest of his life he continued to 'manage' platform speakers. Among famous men whom he 'managed' are Wendell Phillips, William Lloyd Garrison, Robert G. Ingersoll, Henry Ward Beecher, Bill Nye, Max O'Rell, and the Dean of Ely, Charles William Stubbs. He published *Eccentricities of Genius* (1900); *A Summer in England with Henry Ward Beecher*.

PONDER, v. *pŏn'dėr* [F. *pondérer*, to poise, to balance —from L. *ponderārĕ*, to weigh in the mind, to ponder—from *pondus*, a weight: It. *ponderare*]: to weigh in the mind; to examine; to consider; to think on. Pon'dering, imp. Pon'deringly, ad. *-lĭ*. Pon'dered, pp. *-dėrd*. Pon'derer, n. *-dėr-ĕr*, one who ponders. Pon'derable, a. *-ă-bl*, that may be weighed; having appreciable physical weight—opposed to *imponderable*. Pon'derabil'ity, n. *-bĭl'ĭ-tĭ*, or Pon'derableness, n. *-bl-nĕs*, the quality or state of being ponderable. Pon'deral, a. *-ăl*, determined by weight—opposed to *numeral*. Pon'derous, a. *-ŭs*,

weighty; massive; in *OE.*, important; momentous; forcible. PON'DEROUSLY, ad. *-li.* PON'DEROUSNESS, n. *-nĕs*, or PON'DEROS'ITY, n. *-ŏs'ĭ-tĭ*, the state of being ponderous; heaviness; greatness in weight.—SYN. of 'ponder': to muse; examine; consider; weigh; meditate; contemplate; reflect; regard.

PONDICHERRY, *pŏn-dĭ-shĕr'ĭ*, F. *pōng-dē-shār-rē':* chief of the French settlements in India; in the dist. of South Arcot, in the Madras Presidency. The town stands on a sandy plain, and is divided by a canal into a European and a native town. It has a handsome square, where are the gov.gen.'s house, the Rom. Cath. cathedral, and the bazaar. In P. is the high court for the French possessions in Asia, a European college, and an Indian school. The open roadstead is defended by a citadel, and possesses a light-house; and from it mail steamers sail for Europe, Madras, etc. The gov. of P. is gov.gen. of the French possessions in India. Spinning of cotton and fabrication of cotton-thread are the chief manufactures in French establishments.

French Indian Possessions.—Besides P., the French establishments are Mahé in Malabar, Karikal (q.v.) in Tanjore, Yanaon in Godavari, and Chandernagore (q.v.) in Bengal: the extent of the united territories is given by M. Block at 188 sq. m. P. is on the Coromandel Coast, 11° 56′ n. lat., and 79° 54′ e. long., 88 m. from Madras. The territory of P. is divided into three districts—Pondicherry, Villenoure, and Bahour—has 107 sq. m., and comprises 92 villages. Total pop. of the French establishments in India est'd (1890) 280,300; (1901) 273,183. Pop. of the town of P. (1901) 45,583; of dist. of P. abt. 98,000. The town exports indigo, cotton, skins, nuts, oils, etc.: value of its exports and imports combined, about $3,000,000 annually.

History.—The first settlement of the French in India was at Surat 1668. The chief of the French E. India Company at that time was Carou. Subsequently he took Trincomalee from the Dutch; but they were not long in repossessing themselves of it. Carou then turned to the Coromandel coast. In 1672 he took from the Dutch St. Thomé, a Portuguese town (now a suburb of Madras); but two years later, the Dutch retook this place also. Then François Martin collected about 60 Frenchmen and settled them in P., which, in 1674, he had purchased, with the surrounding territory, from Giugee, who had the supervision of all Sivaje's conquests in the country. The Dutch took the town 1693; but by the treaty of Ryswick it was restored to the French 1697. Chandernagore was ceded to the French 1688 by Aurungzebe. In 1727 they obtained the cession of Mahé; 1739 they purchased Karikal from the king of Tanjore; and 1752 Yanaon was ceded to them. Dupleix was gov. of P. when war broke out between France and England; and 1746 La Bourdonnais took Madras. In 1748 Admiral Boscawen besieged P., but two months later was compelled to raise the seige. The peace of Aix la Chapelle in the same year did not put an end to hostilities in India till some time later. In 1757 war recommenced. In 1758 Count de Lally became gov.gen., and

attacked the English settlement of Fort St. David, which surrendered, and was totally destroyed. In 1761 Eyre Coote took Pondicherry. By the peace of Paris, P. was restored to the French 1763 with reduced territory, and also Mahé, Karikal, and Chandernagore. P. was again taken by the English under Sir Hector Monro 1778, and restored 1783. In 1793 the English again repossessed themselves of it, but the treaty of Amiens in 1802 again restored it, but only till the following year. From this time it was held by the English till, by the treaties of 1814–5, it was for the last time restored to France, reduced to the narrow limits assigned by the treaty of 1783.

YANAON is in the Godavari District, about 24 m. s. of Rajahmundry; area, about 5 sq. miles.

MAHÉ is in the Malabar District, 4 m. s. of Tellicherry; area about 2½ sq. miles.

PONDOLAND, *pŏn'do-land:* district about 60 m. square, easternmost part of what was formerly KAFFRARIA PROPER (q.v.), on the Natal frontier, s. Africa. It was the last of the independent Kaffrarian districts absorbed, having been, after 13 years' protectorate, definitely annexed to Cape Colony 1893, Mar. 20. It is inhabited by the Pondos or Amampondos, a Kafir (q.v.) tribe.

Pondweed: *a*, expanded flower (magnified).

PONDWEED, *pŏnd'wēd* (*Potamogēton*): genus of plants of nat. order *Naiadaceæ*, having hermaphrodite flowers, sessile upon a spike or spadix, which issues from a sheathing bract or spathe, a perianth of four scales, four sessile anthers opposite to the scales of the perianth, four pistils, which become four small nuts, and a curved embyro.

Gray's manual describes more than 30 species and varieties in the United States. The species abound chiefly in the rivers, lakes, and ditches, and they are found in other parts of the world. They often present a beautiful appearance in clear streams and ponds, where they protect the spawn of fish and harbor aquatic insects, their seeds also affording food to aquatic birds. The roots are a favorite food of swans. Some species have the leaves all submerged, others have some of their leaves floating, and considerably different in form from the submerged leaves.

PONE, n. *pōn* [N. American Indian]: bread made of Indian meal, with eggs and milk.

PONENT, a. *pō'nĕnt* [L. *ponens*, or *ponen'tem*, placing, setting—from *pono*, I place]: in *OE.*, western; occidental; setting: see note under LEVANT.

PONGEE, n. *pŏn-jē'* [native name], inferior kind of Indian silk.

PON'GO (*Simia* or *Pithecus Wormbii*): ape of the same genus with the Orang-utan or Orang (q.v.), but of much larger size, six ft. or more from the heel to the crown of the head, and covered with black hair, with which dark red hair is mingled. This largest known ape is a native of Borneo, Sumatra, and probably neighboring islands; inhabiting the deepest recesses of the forests, and much more rarely seen by man than its congener the orang-utan, which was formerly supposed by the most eminent naturalists to be the same species in a younger state. The P. is called sometimes the Black Orang-utan. It has a very prominent muzzle, a large mouth, the face nearly naked, except the lower part, which has a beard. Little is yet known of its habits. It is believed to feed chiefly on fruits. It possesses great strength, and like the orang-utan is evidently adapted by its conformation for moving chiefly among boughs of trees.

PONIARD, n. *pŏn'yârd* [F. *poignard*, a dagger—from *poing*, a fist—from L. *pugnus*, a fist—connected with the root of *pungere*, to prick]: a small dagger: V. to stab or pierce with a poniard. PON'IARDING, imp. PON'IARDED pp. *-yârd-dĕd.*

PONIATOWSKI, *po-ne-â-tŏv'skē:* princely family of Poland. The accounts of their descent are conflicting. Perhaps the most usual refers them to Italian origin, as directly descended from the Lombard family of the Torelli, whose ancestors were Counts of Guastalla. One of the Torelli family having settled in Poland, assumed the name P. from his wife's estate of Poniatow in that country. Those of the P. family who make a figure in history are Prince STANISLAS CIOLEK P. (1677–1762), who, in the war of succession to the kingdom of Poland, joined Charles XII. of Sweden in supporting Stanislas Leszczynski; his sons, STANISLAS-AUGUSTUS (1732–98), last king of Poland (q.v.), and ANDREW (1735–73), who rose to great distinction in the Austrian service; and Andrew's son, Prince JOSEPH-ANTON (see below).

PONIATOWSKI.

PONIATOWSKI, Joseph-Antoine, Prince and marshal of France: 1762, May 7—1813, Oct. 19; b. Warsaw; son of Andrew P. (see Poniatowski). At the age of 16 he entered the Austrian army, with which he made the Turkish campaign of 1787, and rose to the rank of col. of dragoons. In 1789 he returned to Poland, and was named commander-in-chief of the army of the south, having under him Kosciusko, Wielhorski, Lubomirski, and other celebrated leaders. His army, though much inferior in numbers to that of Russia which invaded the country 1792, gained the brilliant victories of Polonné and Zielencé; but P.'s uncle, King Stanislas, by agreeing to the convention of Targowitz (q.v.), put an end to the contest 1793. The prince then resigned his command, and went into voluntary exile, but returned in the following year to aid Kosciusko, now dictator, in his fruitless opposition to the third partition of Poland. On the proposal of Napoleon to reconstitute the kingdom of Poland, P. joined the French (1800) at the head of a Polish army, and did good service against the Russians at the battles of Golymin, Danzig, and Friedland; but the French emperor, by the treaty of Tilsit, handed over Poland to its enemies, and only the duchy of Warsaw (nominally subject to the king of Saxony) was left intact. P. was appointed generalissimo and commander-in-chief for the duchy; and so zealously did he labor for development of its military resources, that 1809 he was able to drive the Austrians out of the Polish territory, and to overrun a considerable part of Galicia. He continued to administer the military affairs of the duchy till 1812, when he joined the French army, moving to invade Russia, with a Polish army of 100,000 men. But to his intense disgust, the greater part of his army was broken up into detachments, which were incorporated with the various French legions, and P. was left with not more than 30,000 men under his direct command. At the head of this division, which always composed the extreme right of the French army, P. gathered innumerable laurels on the battlefield, and at the storming of the Russian fortresses; but he was so severely injured at Smolensko during the retreat, that he was obliged to return to Warsaw 1812, Dec. In the following autumn he resumed his old place in the French army, and Oct. 16 received from the emperor the dignity of Marshal of France, an honor, in his own estimation, much inferior to that of 'generalissimo of the Poles,' which he already possessed. After the defeat at Leipsic (q.v.), P. was left with the remnant of his Polish division to protect the French retreat, which he accomplished by keeping the Prussians in check for several hours; at last, when his force was reduced to 300 men with 30 horses, and himself severely wounded, he retreated over the Pleisse, swimming his horse through the river; but in attempting similarly to cross the Elster, was fired upon, and, exhausted by wounds, sank to rise no more. His body was recovered, embalmed and carried to Warsaw, whence it was removed to Cracrow, and placed beside the ashes of Sobieski and Kosciusko.

PONS, n. *pŏnz* [L. a bridge]: in *anat.*, any bridge-like structure, as *Pons hepatis,* a bridge across the umbilical fissure of the liver, *P. Varolii* (the bridge of Varolius), a commissure uniting the two hemispheres of the cerebellum, and forming a connection between the cerebrum, cerebellum, and medulla oblongata.

PONS ASINORUM, *pŏnz ăs-ĭ-nō′rŭm* [L.]: asses' bridge, or bridge for asses: artificial aids to enable the stupid or indolent scholar to surmount difficulties in the field of learning. The phrase Pons Asinorum seems to have originated in the 15th century, and to have been applied first to a treatise of Johannes Buridan, a noted schoolman and commentator of Aristotle—the *Summa de Dialectica,* the aim of which has been represented to be chiefly to supply rules for the easy and rapid discovery of 'middle terms' for syllogisms: thus would the dullest student be made a ready argumentator, able to hold his ground in a disputation on any subject. But the *Summa* cannot be fairly described as a work of that kind. Later the term Pons Asinorum was applied to the 5th theorem of the 1st book of Euclid, apparently on the principle of *lucus a non lucendo:* that theorem is a bridge over which a donkey (i.e., a dunce) either cannot pass at all, to become a geometer, or passes with much stumbling. The 47th proposition of the same book of Euclid also has been called by some Pons Asinorum.

PONTAC, n. *pŏn′tăk* [*Pontac,* in south of France]: a fine kind of claret wine.

PONTA DELGADA, *pōn′tâ dĕl-gâ′dâ,* or PONTE DELGA′DA, *pōn′tā:* town on the s. coast of the island of St. Michael, one of the Azores (q.v.), lat. 37° 40′ n., long. 25° 36′ w. It is defended by the Castle of St. Braz, which can mount 90 pieces of cannon, and by the forts of Sao Pedro and Rosto de Cao. The anchorage in the roadstead is bad and the harbor is shallow, but still the trade (largely in the hands of English merchants) is the most considerable of all the towns in the Azores. The chief exports are wheat, maize, and oranges. Pop. 17,675.

PONTAGE, n. *pŏn′tāj* [F. *pontage,* pontage—from L. *pons,* or *pontem,* a bridge]: a tax paid for the repair of a bridge; the toll paid for passing over a bridge.

PONT-A-MOUSSON, *pōng-tâ-môs-sōng′:* town of France, dept. of Meurthe-et-Moselle, on the railway from Nancy to Metz, 20 m. n.n.w. of Nancy. The Moselle flows through the town, which is in a fruitful valley. There is a fine Gothic church dedicated to St. Martin. Pont-a-Mousson was the birthplace of Marshal Duroc, favorite of Napoleon. It has large cavalry barracks, and some manufactures of pottery. Pop. about 12,000.

PONTCHARTRAIN, *pŏnt-chĕr-trān′,* LAKE: body of water in Louisiana, about 5 m. n. of New Orleans, with which it communicates by a canal. It is 40 m. long, 24

m. in extreme width; is navigated by small steamers, and communicates on the e. with the Gulf of Mexico, and on the s. with the Mississippi. Its greatest depth is 16 to 20 feet.

PON'TE, Gia'como da. See Bassano.

PONTEDERA, *pōn-tā-dā'râ:* town in the province of Pisa, Italy; on the torrent Era, near its confluence with the Arno, 13 m. s.e. of the city of Pisa. In the middle ages, during the wars between Florence and Pisa, it was a walled and strongly fortified place, whose possession was the subject of fierce contention between these rival powers which held it alternately. It has now important manufactures of brick, cotton, woolen, and hempen goods. Pop. 10,817.

PONTEE, n. *pŏn'tē* [F. *pontil,* tool used to skim liquid-glass]: in *glass-works,* the iron rod with which a portion of the liquid glass is gathered up and taken out of the glass-pot—also written *pontil, puntel,* and *punty.*

PON'TEFRACT CAKES: small lozenges of refined licorice, which have for centuries been made at Pontefract, England, and are much esteemed. They are impressed with a rude castellated figure, intended to represent Pontefract Castle.

PONTIAC, *pŏn'tĭ-ak:* city, county-seat of Livingston co., Ill.; on the Vermilion river, and on the Ill. Cent., the Wabash, and the Chicago & Alton railroads; about 95 m. n. by e. of Springfield and 90 m. s. by w. of Chicago. It was settled about 1825, but was founded permanently in 1829, by colonies from Indiana and Ohio. In 1856 it was incorporated, and received a city charter in 1872. It is in a fertile agricultural region in which stock-raising is given considerable attention. In the vicinity are extensive coal-fields. The chief industrial establishments are candy factories, a hook and eye factory, box factory, and large shoe factories. There is considerable trade in coal, grain, live-stock, and manufactures. The principal public buildings are the state reformatory for juvenile offenders, the city hall, the public library, and the church and school buildings. Pop. (1900) 4,266; (1910) 6,090.

PONTIAC: city, county-seat of Oakland co., Mich.; on the Clinton river, and on the Detroit, G. H. & M., the Grand Trunk, and the Pontiac & O. railroads; about 27 m. n.w. of Detroit. It was settled in 1818-20, incorporated as a village in 1837, and in 1861 was chartered as a city. It was named after the Indian chief Pontiac. It is in a section of beautiful lakes in which there is considerable hunting and fishing. It is surrounded by an agricultural region, and has a number of industries connected with farm and forest products. The chief manufacturing establishments are 13 carriage factories, machine shops, a foundry, flour and lumber mills, knit-goods factory, and gas and gasoline engine works. There

are about 1,200 employees in the manufactories. There is considerable trade in farm products, fruit, vegetables, wool, and carriages and wagons. It has the Eastern Michigan Asylum for the Insane, a library building (ladies' library), a public high school library, public and parish schools, and eight churches. The four banks have a combined capital of $250,000 and an annual business of $1,500,000. The government of the city is vested in a mayor and a council of 10 members. The city owns and operates the waterworks. Pop. (1900) 9,769; (1910) 14,532.

PONTIAC, *pŏn'tĭ-ăk:* chief of the Ottawa Indians; 1720-1769; b. near the Ottawa river. By birth and tribal alliances he became chief of the Ottawa, Ojibway, and Pottawattamie tribes. As an ally of the French he defended Detroit against attack by several n. tribes 1746; is supposed to have been present with the Ottawas at Braddock's defeat 1755; opposed Major Rogers's invasion of the Indians' territory 1760; and two years afterward organized a conspiracy among numerous tribes for extermination of all English garrisons in their vicinity. They attempted first the capture of Detroit, but the garrison, warned in time, made a successful resistance. Then the English resolved to attack the Indians (1763, July 31); but they had been warned by Canadians, and leading the English into an ambuscade at the Bloody Bridge, defeated them severely. May 12—Oct. 12 the Indians captured Forts Sandusky, St. Joseph, Miami, Ouatanon, Mackinaw, Presque Isle, Le Bœuf, and Venango, and massacred the garrisons. Pontiac abandoned the siege of Detroit Oct. 12, and retired to the Maumee river, having lost much influence over his followers. He then attempted to renew organized warfare on the English, but Sir William Johnson pacified the Indian leaders, and induced Pontiac to sign a treaty of peace at Oswego 1766. Pontiac was assassinated at Cahokia, Ill., by a Kaskaskia Indian.

PONTIANAK, *pōn-tē-â-nâk':* city, cap. of the kingdom of Pontianak, on the w. coast of the Island of Borneo, near the junction of the Landak and Kapuas. It is built on both banks of the river, which is 900 ft. broad, and thence to the sea is called the Pontianak. The city is important as the seat of the Netherlands' Resident, who rules directly and indirectly over the whole w. coast, 2° 56′ s.—2° 50′ n. lat., and 108° 45′—112° 50′ e. long.; territories rich in vegetable and mineral wealth. The Residency House is near Fort Du Bus, 0° 2′ n. lat., and 109° 1′ 30″ e. long.; other principal buildings being the sultan's palace, the mosque, and hospital. Trade is the only pursuit in the town; and the rich alluvial lands are partly cultivated for rice, sugar-canes, cotton, indigo, coffee, provisions, and fruits. Pop. of city 9,000, including 2,000 Chinese. See BORNEO.

PONTIFEX, n. *pŏn'tĭ-fĕks*, plu. PONTIFICES, *pŏn-tĭf'ĭ-sēz* [L. *pontifex, lit.*, a path or bridge maker—from *pons* or *pontem*, a bridge, and *facĕrĕ*, to make: F. *pontife:* It. *pontefice*]: in *anc. Rome*, a high priest. PONTIFF, n. *pŏn'-tĭf*, a high-priest; a title applied to the pope, though he is usually styled the *supreme pontiff* (see below). PONTIFICAL, a. *pŏn-tĭf'ĭ-kăl*, in *Milton*, of or pertaining to bridge-building; also PONTIF'IC, a. *-ĭk*, of or relating to a high-priest or to the pope: thence splendid; magnificent. PONTIF'-ICAL, n. book containing ecclesiastical rites and ceremonies (see below): PLU. the full dress and ornaments worn by an officiating priest or bishop. PONTIF'ICALLY, ad. *-lĭ*. PON TIF'ICATE, n. *-kāt*, office or dignity of a high-priest or of the pope; the reign of a pope: V. to exercise solemn priestly functions with full ceremonial, said of the higher dignitaries of the Rom. Cath. Chh., as 'to pontificate at high mass.'

PONTIFEX, *pŏn'tĭ-fĕks* [see PONTIFEX]: among the ancient Romans, title borne by the members of one of the two great colleges instituted for preserving and cultivating religious knowledge; the other was the college of Augurs: see AUGURIES and AUSPICES. It is customary to speak of the college of pontiffs as a 'priesthood;' however, strictly speaking, it was not that—i.e., the members were not charged with the worship of any particular divinity, nor did they conduct sacrifices. Their duties comprised the regulation of all the religious rites and ceremonies (both public and private) of the state—e.g., the mode in which the gods should be worshipped, burials conducted, and the souls of the dead (manes) be appeased. To the pontiffs was intrusted the care of the calendar, the proclamation of festival days, etc. They also saw that every religious and every judicial act took place on the right day. 'As they had thus,' says Dr. Mommsen, 'an especial supervision of all religious observances, it was to them in case of need (as on occasion of marriage, testament, or *arrogatio*) that the preliminary question was addressed, whether the matter proposed did not, in any respect, offend against divine law.' In matters of religion, they were the supreme authorities; from their decisions there was no appeal, and they themselves were responsible neither to the senate nor the people; further, they had power to inflict punishment on such priests as dared to disobey their injunctions and deviate into schismatical courses. The words of Festus are: *rerum quæ ad sacra et religiones pertinent*, JUDICES ET VINDICES. Their president was termed *pontifex maximus*.

The pontiffs, according to Roman tradition, were instituted by Numa—a mythical person, to whom the origin of nearly all the religious institutions of Rome is ascribed. But as they appear in all the Latin communities, they are regarded by Mommsen as a 'thoroughly national Italian institution,' and probably found a place in the earliest religious organization of the Latin race. Their number was originally four, or, including the *pontifex maximus*, five, all of whom were taken from the patricians. B.C 300 the Ogulnian Law raised the number to nine, four of whom

were to be plebeians. The first plebeian who attained the dignity of *pontifex maximus* was Tib. Coruncanius, B.C. 254. Sulla, B.C. 81, again increased the number to 15, and Julius Cæsar to 16. During the empire, the functions of *pontifex maximus* were generally discharged by the emperors themselves; and the name survived even the establishment of Christianity, occurring in inscriptions of Valentinian, Valens, and Gratianus; but at length the emperors dropped it, and it was picked up by the Christian bishops of Rome; and now forms one of the sacred designations of his holiness the pope.

PONTIFICAL, *pŏn-tĭf'ĭ-kal:* one of the service-books of the Church of Rome, in which are contained the several services, whether in the administration of sacraments, or the performance of public worship, in which the bp. exclusively, or at least a priest delegated by the bp., officiates. There were many such collections for the various national churches; but that now in use throughout the Western Church is the *Pontificale Romanum,* or Roman Pontifical, as published by authority of Clement VIII. 1596, and repeatedly republished. The P. contains the services for ordinations, for religious professions, and receptions of monks and nuns, consecrations, benedictions, etc., as well as of the solemn administration by a bishop of those sacraments ordinarily administered by priests. Besides the prayers to be recited, the P. lays down the cermonial to be observed. The rules of this ceremonial are of two kinds—*preceptive,* whose literal observance is obligatory; and *directive,* admitting of a certain interpretation.—Another of the service-books of bishops is called the 'Ceremoniale;' but it is chiefly confined to a description of the peculiar ceremonial with which bishops are required to celebrate solemnly those offices, as of the mass, vespers, the funeral office, etc., which are common to them with priests. The most prized editions of both these service-books are those published by authority of the learned pope, Benedict XIV.

PONTIFICAL STATES: see PAPAL STATES.

PONTIFICE, n. *pŏn'tĭ-fĭs* [L. *pons* or *pontem,* a bridge, and *facĕrĕ,* to make]: in *OE.,* the edifice of a bridge.

PONTIGNY, *pŏng-tēn-yē':* village in France, nearly 20 m. from Auxerre. It is noted as the seat of a splendid abbey, founded 1150, at which Thomas à Becket found a refuge 1164, and several English bishops at a later period. In the middle ages it became a resort for pilgrims. The Huguenots burned both the abbey and the magnificent church 1568. A portion of the former was repaired and is used by the Dominicans. The church, built in Gothic style in the 14th c., has been restored by the govt. to its former glory, and is still visited by Rom. Cath. pilgrims.

PONTINE, a. *pŏn'tĭn* or *-tīn* [L. *Pomptīnæ Palūdes*, the Pontine Marshes: It. *Pontino:* F. *Pontin*]: applied to the extensive marshes or sea-fens near Rome. The *Pontine Marshes* form a low-lying district, the s. part of the Campagna di Roma; and extending s.e. from Cisterna to the sea at Terracina; greatest length about 30 m., breadth 4 to 11 m. The dist. does not reach the sea-coast on the w., being separated from it by a broad sandy track covered with forest; but even this barrier partakes to some extent of the character of the marshes themselves, being quite as flat, and largely intermixed with swamp and lagoon. The marshes have undoubtedly been formed by stagnation of the streams that rise in the Volscian Hills, and by the accumulation of sand along the shore from Astura to the Circeian promontory, but this formation as undoubtedly belongs to prehistoric ages. There is no reason to believe that these marshes were, in ancient times, essentially different from what they are at present. Pliny, indeed, on the authority of a contemporary, Mucianus, states that at one period they had contained 24 or even 33 cities; but no confirmation of this statement is found in any earlier writer, and not a single name of these cities has been preserved. The first attempt to drain the marshes in ancient times was in B.C. 160 by the consul, Cornelius Cethegus; but his efforts were only partially successful, for toward the close of the republic, the region had become as marshy as ever. Julius Cæsar, among his vast schemes for improvement of the commonwealth, projected one for the drainage of this pestilential district, but his murder prevented its complete realization. Augustus also appears to have done something; but in the time of Juvenal, it was a mere haunt of robbers. Theodoric, the Goth, likewise tried to reclaim it; but the desolations of succeeding reigns soon reduced it to a hopeless condition, and it continued an uninhabitable region until the close of the middle ages. The first in modern times to resume the effort of the ancients was Pope Boniface VIII., who drained the district about Sezzo and Sermonetta by a large canal. In 1417 Martin V. made another canal, the *Rio Martino*, which was dug to within a mile of the sea; but after his death, the project was given up. Several additional efforts were made; but nothing was accomplished till the time of Pope Pius VI., who, 1778, began to drain the marshes, and completed the drainage in ten years. The reclamation of the land, however, has been found possible only in part. Though much is under cultivation and in pasturage, a great portion is hopelessly irreclaimable; and the whole region is so unhealthful, that in the summer the inhabitants are driven to the neighboring mountains.—The famous Appian Way (q.v.) went through the P. M.; and after being unused for centuries, was reopened by Pius VI.

PONTLEVIS, n. *pŏnt'lĕ-vĭs*, or *-lē'-* [F. *pont-levis*, a drawbridge—from L. *pons*, a bridge; *lĕvis*, light]: the resistance of a horse by rearing repeatedly on his hind legs.

PONTOON, n. *pŏn-tôn'* [F. *ponton;* It. *pontone*, a bridge of boats—from L. *pontōnem,* a punt, a pontoon—from *pons* or *pontem*, a bridge]: flat-bottomed boat, or any light framework or float (e.g., large copper or rubber cylinder or empty barrel), used in construction of a temporary bridge across a stream (see below). In hydraulic engineering, P. is a water-tight structure to be placed beneath a submerged vessel to aid in its floating; also a water-tight frame to be filled with water and sunk, rising when empty —used to close the entrance to a sluice or dock: see FLOATING DOCK. PONTONIER, n., or PONTONNIER, n. *pŏn'-tŏn-ēr'*, a soldier having charge of pontoons. PONTOON-BRIDGE, temporary bridge made by means of floating bodies. PONTOON-CARRIAGE, a light carriage with two wheels. PONTOON-TRAIN, equipment of carriages and materials carried with an army, for construction of bridges. —*Pontoon* is the name given to any buoyant support of a bridge. P.-bridges have been constructed with greater or less skill, from earliest times. Darius passed the Hellespont and Danube by P.-bridges, and the Hellespont was traversed by Xerxes's immense army on similar temporary bridges, admirably formed. A P.-train is a necessity for every army manœuvring in a country where there are rivers, and many campaigns have proved failures from lack of this cumbrous but indispensable apparatus. In most armies, the pontoons are under charge of the engineers; but in the Austrian army there is a distinct and highly trained corps, called *Pontonieren.* Marlborough used clumsy wooden pontoons. Napoleon and Wellington had them lighter, of tin and copper. They were flat-bottomed, rectangular boats, open at the top. Anchored at stem and stern, beams were laid over from one to another, and transoms with planks crossing these beams completed the roadway of the bridge. These open pontoons were exposed to the disadvantage that they were very liable to be filled with water, and thus ceased to support the bridge. They were, moreover, very heavy, one P., with appurtenances, constituting a wagon-load. As 36 were deemed necessary for the train, a P.-equipment was a serious item in the *impedimenta* of an army. Hence the open bateau P. was for some time superseded by the closed cylindrical P. of copper or of India-rubber, which is far lighter, can in an emergency be rolled along the ground, and can be submerged only when perforated.—The pontoons of the U. S. army are of two kinds—viz., wooden bateaus and canvas bateaus (both open). The wooden bateau is a flat-bottomed boat about 31 ft. long; it weighs about 1,400 lbs. and has a flotation of about 18,000 lbs. The canvas bateau is flat-bottomed, and is of rectangular section except at the ends. At top the length is about 20 ft., at bottom 18 ft.; width 5 ft.; depth 2¼ ft. The skeleton of the canvas bateau consists of 2 side-frames connected by movable transoms: the canvas is made water-tight by application to both sides of a composition of hemp-seed oil, wax, India-rubber, and other ingredients. The canvas P. weighs about 700 lbs.,

and its flotation-power is about 13,000 lbs.—The closed cylinder P. of tin or copper has been largely superseded in the Brit. army service by canvas and wooden open bateaus Capt. Fowke of the Brit. engineer corps invented a folding open bateau, made of waterproof canvas attached to sliding ribs, so that for transport it can be made to collapse like the bellows of an accordeon. Its 'theoretical buoyancy' (length 22 ft.) is 13,600 lbs., but its actual buoyancy in water is only 8,640 lbs. The latest form of P. for the Brit. army is the invention of Col. Blood, of the engineers. It is an open wooden bateau, 21½ ft. long, 280 cubic ft. displacement, actual flotation 17,500 lbs. This P. consists of 6 sets of framed ribs connected by a deep keelson, 2 side streaks and 3 bottom streaks. The sides and bottom are of thin yellow pine with canvas glued to both surfaces by India-rubber solution, and coated outside with marine glue. The process of throwing a bridge across in face of an enemy is fraught with the utmost danger to the engineers employed. P. bridges have to be passed with great care; and every measure should be adopted (breaking step, etc.) which can reduce the peculiarly dangerous vibration.

PONTOPPIDAN, *pon-tŏp'ĭ-dân,* Erik: bishop and historian: 1698, Aug. 24—1764, Dec. 20; b. Aarhuus, Denmark. He studied theol. at the Univ. of Copenhagen, and on finishing his education became travelling tutor to several youths in succession. He was made adjunct prof. of theol. at Copenhagen 1738, and bp. of Bergen, Norway, 1747. He wrote many works on the history, geography, natural history, etc., of Denmark and Norway. P. is known to 'Anglic' readers best through his *Norges Naturlige Historie* (translated into Eng., *Natural History of Norway*), with its stories of the Kraken, sea-serpent, etc.

PONTREMOLI, *pōn-trĕm'ō-lē:* town in the province of Massa-Carrara, Italy, 700 ft. above the sea, 23 m. n.w. of Carrara. P. was an important place in the middle ages, strongly fortified, and defended by a castle which still overlooks the old town from a neighboring hill. The modern portion has a fine cathedral and well-paved streets. It is largely engaged in the cattle trade, and the manufacture of homespun linens, woolen goods, silks, etc. P. suffered from a severe earthquake 1834. In 1859 it passed under the rule of Victor Emmanuel. Pop. 13,000.

PONTUS, *pŏn'tŭs:* name given by the ancient Greeks to a country in n.e. Asia Minor, bordering on the Pontus Euxinus (whence its name), extending from the river Halys in the w. to the frontiers of Colchis and Armenia in the e. Its s. limits were the ranges of Anti-Taurus and Paryadres, so that it corresponded nearly to the modern pashaliks of Trebizond and Siwas. On the e. and s., P. is mountainous, but along the coast are large and fertile plains, now and in ancient times productive of abundance of grain, fruits, and timber. Game also, according to Strabo, was plentiful. The rearing of bees was carefully attended to, and honey and wax were among chief articles of commerce. Iron was the principal mineral.

Regarding the ancient inhabitants of P., nothing is known ethnologically. Greek colonies, indeed, flourished on the coast from B.C. 7th c., and doubtless spread some knowledge of civilization among the inland barbarians; but how far the latter were influenced thereby, we cannot tell. They appear first as divided into numerous tribes, virtually independent, but owning nominal allegiance to the Persian kings, whose authority was represented by a hereditary satrap belonging to the royal family of Persia. One of these satraps, Ariobarzanes, by subjugating some of the Pontian tribes, B.C. 363, during the reign of Artaxerxes II., laid the foundations of an independent sovereignty. Ariobarzanes was succeeded B.C. 337 by Mithradates II., who took advantage of the civil confusions that followed the death of Alexander the Great to enlarge his dominions; but the greatest of these Pontine sultans, and one of the most formidable enemies that Rome ever encountered in the East, was Mithradates VI. (q.v.). On the overthrow of this potentate by Pompey, B.C. 65, the w. part of P. was annexed to Bithynia, and the rest parcelled out among neighboring princes. Subsequently, a grandson of Mithradates, Polemon, was installed monarch of central P.; but in the reign of Nero, it was voluntarily ceded to the Roman emperor, became a Roman province, and was called *Pontus Polemoniacus*. In the reign of Constantine, it underwent a new division. The principal towns of anc. P. were Amisus, Polemonium, Pharnacia, Cerasus, Trapezus, Apsarus, Cabira, and Neocæsarcia.

PON'TUS EUXI'NUS: see BLACK SEA.

PONT-VOLANT, n. *pŏnt-vō'lănt* [F. *pont*, bridge; *volant*, flying]: a flying bridge; a kind of bridge used in sieges for surprising a post or outwork that has but a narrow moat. It is composed of two small bridges laid one upon the other, and so contrived that, by the aid of cords and pulleys, the upper one may be pushed forward till it reaches the intended point.

PONTYPOOL, *pŏn'tĭ-pōl:* small market-town of Monmouthshire, England, 20 m. w.s.w. of Monmouth, 10 m. n. of Newport, with both of which it is connected by railway. Japanned wares were long made here, but this manufacture has declined. Articles in polished iron are made, and the iron forges and coal and iron mines which surround the town employ many of the inhabitants. Pop. 6,000.

PONTYPRIDD, *pŏnt-e-prĭth';* called sometimes NEWBRIDGE: a town in Wales, on the Taff river, where it unites with the Rhondda, and on the Glamorganshire canal, 12 m. from Cardiff. It is one of the market-towns, and is famous for a fine single-arch bridge across the Taff, built by William Edwards, a self-educated mason. Near P. is a noted rocking stone, weighing 9½ tons, around which are remains supposed to date from the time of the Druids. Development of the coal and iron industry in the vicinity has given the town rapid growth. There are chemical works, iron and brass foundries, and manufactures of

chains, cables, and anchors. Among the principal buildings are the court-house, masonic hall, and St. Catherine's Church. Pop. (1881) 12,317, (1891) 19,971.

PONY, n. *pō'nĭ* [Gael. *ponaidh*, a docked horse: comp. Pol. *konik*, a little horse—from *kon*, a horse]: common name of many small active breeds of Horse (q.v.), belonging to different countries, from India and Africa to Iceland: but in warmer countries found chiefly in mountainous or sterile regions. They are in general the property of man, and not truly wild; though, in very many cases, they live in almost a wild state, and receive no care or attention except when they are wanted for use. They are in general very hardy, and their strength is great in proportion to their size. They are often vicious, or at least playfully tricky, much more than is usual with larger horses. Ponies are very often covered with rough hair, and have large shaggy manes and forelocks. The *Shetland P.* is a very good specimen of these small races of horse. The *Iceland P.* is scarcely different from it, and is hardy enough to endure the winter of Iceland without shelter. The *Galloway*, *Welsh*, *Dartmoor*, *Exmoor*, and *New Forest* breeds are British races of P., larger than the Shetland. The progress of inclosure and cultivation in their native regions has so changed the circumstances in which they long subsisted, and in which, perhaps, they originated, that scarcely any of them are now seen of pure and unmixed race. Sardinia and Corsica have small races of P., which have subsisted unchanged from ancient times. In the Morea, there is a race of ponies, driven in herds to Attica for sale, exceedingly wild and vicious, but capable of being rendered very serviceable. There are many races in Europe and Asia. They differ considerably in size—some, like the Shetland P., suggesting a comparison with a large dog; some much larger. They differ much in color also; a dun or tan color, with a black stripe along the back, is prevalent in many. Ponies are seldom employed in agricultural labors; but they are of inestimable value in many wild and mountainous regions, from their hardiness and sure-footedness; and are used often as saddle-horses, the largest kinds being employed as horses for light cavalry.

There is no native breed of the P. in America. The mustang, found in Cal., Texas, and adjoining regions, and in Mexico, is unquestionably descended from horses which were imported by the early Spanish discoverers and explorers. Some of these horses became wild, and their descendants have greatly changed from the domestic type. The mustang is sometimes called the Indian Pony, but the latter name seems more properly to belong to the wild horses found farther north. These horses came probably from stock owned by French and English colonists. They resemble the mustangs, but are somewhat larger, and in some respects superior. Their number is much less than that of the mustangs. The mustang is sometimes called a broncho, but in some places the latter term is restricted to a cross between a mustang and a horse. The mustang is not often more than 13 hands high, has rather flat feet,

and is almost wholly lacking in the beauty and grace of the domestic horse. He is strong, vigorous, is cheaply kept, and endures labor and hardship better than the horse. But the mustang is not often thoroughly trained, almost invariably retains some of the wildness of his nature, and is frequently vicious. He is liable to be scared, or to be seized with frenzy, and, for the time being, break loose from all control. Mustangs go in herds, each of which has its leader. When attacked by wolves, or other wild animals, the mares are formed in a circle, with their heads toward the centre. The colts remain within this ring, and the stallions range around the outside. In these contests the mustangs are invariably victorious. Frequent pursuit has made the mustangs very shy of man, but they are taken with the lasso by expert hunters. They are readily brought into moderate subjection: this is thought to be due to the fact of their descent from domesticated stock. In portions of S. America are many wild horses which resemble the mustangs of this country. They are supposed to be descended from a few horses imported from Spain at an early period, and which escaped from domestication about 1535.

POOD, n. *pôd:* a Russian weight of 36 lbs. avoirdupois

POODLE, n. *pô'dl* [Ger. *pudel*, a poodle: Dut. *poedele*, to paddle in the water; *poedel-hond*, a rough water-dog]: a kind of dog, of stout form, with a short muzzle standing out abruptly from the face; ears of moderate length, and pendent; tail rather short. The P. is everywhere covered with long curled hair, which in many of the little barbets hangs to the very ground. No kind of dog exhibits greater intelligence or greater affection. The P. was originally German, but was extensively diffused throughout Europe during the wars of the French Revolution, and abundantly introduced into Britain by the soldiers who served in Spain and the Netherlands. It is very closely allied, however, to the coarser crisp-haired *Water-dog*, long well known in England, known particularly to water-fowl shooters and the fishermen of the n.e. coasts. The *Barbet* of the French is a diminutive variety, much in request as a lady's pet.

POOH, POOH! int. *pô* [originally representing the sound of spitting, as in disgust: Gr. *ptuō;* L. *spuo*, I spit]: an exclamation of contempt, dislike, or disgust.

POOJAH, n. *pô'jâh* [Skr. *pūjā*]: a religious act of worship performed by a Hindu of high caste after bathing.

POOL, n. *pôl* [AS. *pól:* Dut. *poel*, a puddle: Icel. *pollr*, a standing water: W. *pwll*, a pool: Gael. *poll*, mire, a bog: It. *paludo;* L. *palus*, a swamp]: a piece of standing water less than a lake; a small collection of water, or of a liquid in a hollow.

POOL, n. *pôl* [F. *poule,* a pool for stakes at cards]; the stakes in certain games; the receptacle for them; also a game in billiards (q.v.). POOL-SELLING, disposing of the contingent right to a share in a sum of money consisting of the wagers laid by a number of persons on the success of a horse in a race, or of a team in a game of football, etc. The share in the pool due to each successful better is proportioned to the amount wagered by him. Pool-selling falls within the legal definition of 'gaming' —viz., 'a contract between 2 or more persons by which they agree to play by certain rules at cards, dice, or other contrivance, and that one shall be the loser and the other the winner.' The laws of nearly all the states prohibit betting (and hence pool-selling) and the winner has no legal means of enforcing the payment of his winnings. In most of the states, stake-holders (and pool-sellers are stake-holders) can be obliged to refund stakes deposited with them on an illegal wager, even though they have paid the money to the winner.

POOL, MARIA LOUISE: American novelist: b. Rockland, Mass., 1841, Aug.; d. there 1898, May 19. For several years she was a contributor to the New York *Evening Post* and was also connected with the New York *Tribune.* She excelled in descriptions of life in New England and among her works are: *In Buncombe County; A Vacation in a Buggy* (1887); *Tenting at Stony Beach* (1888); *Rowena in Boston* (1892); *Mrs. Keats Bradford* (1892); *In a Dike Shanty* (1896); *In the First Person* (1898).

POOLE, *pôl:* chief seaport of Dorsetshire, England; on a wide but shallow inlet in the e. coast. Along the shore are capacious quays, well lined with shipping. The town is noted more for its trade than for its architecture. Sail-cloth and cordage are manufactured, and, together with potter's and pipe clay, provisions, and articles of clothing, are principal articles of export. Ship, and especially yacht, building is carried on. Brownsea Island, in the middle of the inlet, is 6 m. in circumference: on its extreme point stands Brownsea Castle. Pop. about 16,000.

POOLE, JOHN: 1786-1872; b. England: playwright. He was author of many dramatic pieces, character sketches, novels, and essays. Some of his farces were acted in London theatres by comedians like Liston, Cooper, and Keeley, and are still favorites. His works have been extensively republished in the United States. His old age was spent in neglect and want, brightened only by a small pension from the civil list, procured by Charles Dickens. His fame rests principally upon the widely popular comedy, *Paul Pry* (1825), and his farce, *Twixt Cup and Lip* (1826). Other plays of his that may be named are: *Hamlet Travestie* (1813); *Who's Who, or the Double Imposture* (1815); *Deaf as a Post* (1823); *The Wife's Stratagem* (1827); *Lodgings for*

Single Gentlemen (1829). He also wrote the satirical sketches: *Little Pedlington and the Pedlingtonians* (1839); *Comic Miscellany* (1845); etc.

POOLE, MATTHEW: English compiler: b. York 1624; d. Amsterdam 1679, Oct. 12. He studied at Emmanuel College, Cambridge, and took orders, but in 1662 was ejected by the Act of Uniformity from his church of St. Michaelle-Querne in London, and turned his leisure to good account by spending ten years on his *Synopsis Criticorum Biblicorum,* an attempt to condense into one work the opinions of all the biblical critics of all times and countries previous to his own. The work extended to five large folio volumes. Poole also wrote *Annotations upon the Holy Bible* (1683-5), and other works.

POOLE, PAUL FALCONER: 1806-79; b. Bristol, England: artist. He was a self-taught painter whose work, while it defied anatomical rules, was so masterly in color, and so thrilled with poetic sympathy and dramatic power, that it gained for him a distinguished position among British artists. At the age of 25 he exhibited his first picture, *The Well,* a scene in Naples, in the Royal Acad. In 1837 his picture, *By the Waters of Babylon,* gave him an almost cosmopolitan reputation. His *Solomon Eagle* (1843) added to his fame. He was made an academician 1861, and received a medal at the Paris Universal Exhibition 1855.

POOLE, REGINALD LANE, M.A., PH.D.: English educator and author: b. London 1857, March 29. He was educated at Oxford and at the University of Leipsic, in 1880-1 was assistant in the department of manuscripts in the British Museum and since its establishment in 1885 has been editor of the *English Historical Review.* He has lectured in modern history at Jesus College, Oxford, since 1886 and is also lecturer on diplomatics in the University of Oxford. He has published: *A History of the Huguenots of the Dispersion* (1880); *Sebastian Bach* (1882); *Wycliffe and the Movement for Reform* (1889); edited Wycliffe *De Civili Dominio Liber I* (1885), and *De Dominio Divino* (1890); *Historical Atlas of Modern Europe* (1897-1902); etc.

POOLE, REGINALD STUART, LL.D.: 1832, Feb. 27—1895, Feb. 8; b. London. He was given a place in the Brit. Museum, 1852, and made assistant keeper of coins 1870. He was author of various works relating to coin, and of lectures on archæology and art; correspondent of the Institute of France, member of the German Archæological Institute, life governor of the University College, vice-president of the Egyptian Exploration Fund, and secretary of the Society of Medalists. He edited a valuable coin catalogue; and also contributed to the *Encyc. Britannica, Smith's Dictionary of the Bible, Kitto's Cyclopædia,* etc.

POOLE, STANLEY LANE. See LANE-POOLE, STANLEY.

POOLE, *pôl*, William Frederick, ll.d.: 1821, Dec. 24—1894, Mar. 1; b. Salem, Mass. Graduated at Yale 1849; compiled two indexes of periodical literature 1848 and 53; brought out a third and enlarged edition in co-operation with the Amer. and Brit. Library assocs. 1882; was asst. librarian of the Boston Athenæum 1851, librarian of the Boston Mercantile Library 1852–56, and of the Boston Athenæum 1856–69; organized libraries in Waterbury, Conn., St. Johnsbury, Vt., Newton and Easthampton, Mass., and the U. S. Naval Acad., 1869; organized and was librarian of the Cincinnati Public Library 1869–74, and similarly served the Chicago Public Library 1874–87; and in 1887 was engaged as organizer and librarian of the great Newberry Library, Chicago. He was president of the American Library Assoc., was vice-pres. of the International Conference of Librarians, London 1877, and has published numerous works and papers on library, historical, and miscellaneous subjects.

POOLER, n. *pôl'ėr:* an instrument used for stirring a tan-pit.

POONA, or Puna, *pō'nâ:* capital of the dist. of P., Brit. India, in the presidency of Bombay; on the small river Moota, near its confluence with the Moola, in a treeless plain about 74 m. s.e. of Bombay. In its palmy days, when it was cap. of the Mahratta power, it is said to have contained a pop. of a quarter of a million. A large proportion of the people are Brahmans. The city is divided into seven quarters, named after the days of the week, and the principal building is a palatial structure, formerly the residence of the Peishwah. The climate is salubrious and pleasant, and P. is the headquarters of the Bombay army. In 1821, soon after P. came into British possession, a college was established for the study of Sanskrit literature, in the hope that the disaffected Brahmans (who had been all-powerful under the Peishwah) might be thus conciliated. As the modes of instruction originally adopted were entirely native, and far from efficient, the college has gradually been transformed. At present it has a staff of European professors, with native assistants, and is a highly respectable seminary for the study of English, Marathi, and Sanskrit. Only Brahmans were admissible into the college as first established; now it is open to the public generally. P. is much resorted to, particularly in the rainy season (June–Oct.), for its pleasant and salubrious climate. The fall of rain averages 22 to 25 inches annually; whereas at Bombay it is about four times as great. The range of the Ghauts (properly called the Sahyadree range), a precipitous barrier 2,000 ft. high, with peaks considerably higher, receives the full burst of the monsoon; so that Khandalla, on the top of the Ghauts, is drenched with almost perpetual rain for four months. Then the clouds pass on, relieved of their watery burden, and the rainfall e. of the Ghauts is much less. From the Ghauts, the whole country gradually slopes toward the Bay of Bengal. P. is about 1,800 ft. above sea-level. One of the most interesting objects in the neighborhood of P. is a large *bund*, or embankment, solidly built

of hewn stone over the Moota Moola river for the purpose of providing a supply of water for the military cantonment, especially the bazar or native town connected with it. It was built by the late Sir Jamsetjee Jeejeebhoy, whose charities were very great. Two forts celebrated in Maratha history are near—Singhur about 12 m. s.e., and Poorundur, about 18 m. s. These are favorite sanatoria during the hot season (Mar.-June). At Poorundur is a sanatorium for sick soldiers. P. was formerly a great mart for jewellery and precious stones, but this trade has ceased. The native manufactures have been supplanted by introduction of European piece-goods, and the only business that prospers is that of dealers in grain and other agricultural produce. The railway has rendered P. almost a suburb of Bombay. The railway climbs the great mountain barrier of the Ghauts from the low lands of the Konkan to the high table-land of the Deccan by the boldest engineering works: the line up the Ghauts was opened 1863.

Among many new buildings in recent years is the Government College—a Gothic building erected mainly at the expense of Sir Jamsetjee Jeejeebhoy. The Scottish mission (Presb.) began English education in P. 1831, and has continued it steadily: its schools for boys and girls, both for English and for the vernacular (Marathi), are largely attended, even by the highest castes. The girls number more than 300; and one school consists of Mussulman girls. The Mussulmans in India generally are far behind both Hindus and Parsees in their desire to educate the women: in fact, a Mussulman girls' school is rare. Pop. of P. (1901) 111,385.

POONA-WOOD, *pô'na-wûd:* timber of the Poon trees of India (*Calophyllum inophyllum* and *C. augustifolium*). It is commonly used in the E. Indies, particularly in ship-building, for planks and spars: the latter are usually called *Poon.* The trees are natives of Penang, and of the countries eastward of the Bay of Bengal.

POOP, n. *pôp* [F. *poupe*; It. *poppa*—from L. *puppis,* the hinder part of a ship]: in large vessels, a sort of supplemental deck raised over the after-part of the upper deck, and extending to the mizzen-mast. The best cabins are beneath it. In old ships, a second and even a third poop were raised above the hinder part of the poop proper, giving the vessels that immense height at the stern shown in old drawings. The poop is gradually disappearing from ships built either for speed or war, as offering undue resistance to the wind in one case, and an undesirable mark to an enemy in the other. POOP, v. to strike a ship in the stern; to sink it; to roll over the stern, as the waves of the sea. POOP'ING, imp.: N. the shock of a heavy sea on the stern or quarter of a ship; the action of a ship running her stern against the stern of another. POOPED pp *pôpt.*

POOR, a. *pôr* [prov. F. *poure;* F. *pauvre;* It. *povero*—from L. *pauper*, poor, needy]: having small means; needy; of little or no use or value; paltry; mean; wanting in strength, beauty, or dignity; not fertile, as a soil; worthy of compassion; spiritless; dejected; lean; emaciated; without good qualities; wretched or miserable, in contempt; in *Scrip.*, frequently, humble or contrite. POOR'LY, ad. *-lĭ*, with little or no success; without adequate means: ADJ. somewhat ill; indisposed. POOR'NESS, n. *-nĕs*, the state or condition of being poor. THE POOR, indigent persons collectively; those depending on public or private charity (see below). POOR-HOUSE, a residence for persons receiving public charity. POOR-LAWS, laws regulating relief for the poor (see below). POOR-RATES, money raised by law for the support of the poor (see POOR—POOR-LAWS: OVERSEERS). POOR'S-ROLL, in Scots law, list of poor persons who are litigants, but unable to pay the fees of court, and are therefore obliged to sue *In Forma Pauperis* (q.v.). POOR-JOHN, the torsk or hake, a sort of fish, so called as being formerly a cheap kind of fare—but see HABERDINE. POOR-SPIRITED, a. mean; cowardly.—SYN. of 'poor': indigent; needy; necessitous; penurious; destitute; wanting in; lean; starved; meagre; barren; dry; sterile; trifling; paltry; mean; contemptible; unimportant; unhappy; uneasy; depressed; low; dejected; flaccid; valueless; narrow; dear.

POOR, *pôr*, DANIEL, D.D.: Christian missionary: 1789, June 27—1855, Feb. 3; b. Danvers, Mass. He graduated at Dartmouth Coll. 1811, and at Andover Theol. Seminary 1814; became pastor of a Presb. church in Newburyport 1815, but soon went as missionary to Ceylon, arriving there 1816, March, and residing at Colombo until 1823, when he took charge of the seminary at Batticotta. He went to Madura 1836, and to Jaffna 1841; organized 37 schools, and preached much in the open air. On account of ill-health, he spent the years 1848–50 in the United States, but gave many missionary addresses. Returning to Ceylon 1851, he labored at Manepy until his death by cholera. He was buried at Tillipally. His writings, besides contributions to the *Bibliotheca Sacra* and other periodicals, were tracts for distribution. He was scholarly, amiable, full of enthusiastic zeal—type of one out of many groups of Christians who have devoted themselves to similar self-denying work.

POOR, ENOCH: soldier: 1736, June 21—1780, Sep. 8; b. Hackensack, N. J. He was a merchant at Exeter, N. H., when the N. H. legislature, after the battle of Lexington, ordered a levy of troops: the command of one of the three regts. was given to P. With this regt. he served in the disastrous expedition to Canada. Appointed brig.-gen., he distinguished himself at Stillwater and at Saratoga, and afterward shared the hardships of the army at Valley Forge. His bravery and skill were conspicuous in the battle of Monmouth, and he commanded a brigade in Sullivan's expedition against the Six Nations. He had just received his appointment to the command of a brigade in Lafayette's light-infantry division when he died of fever

POOR CLARES. See MINORITES.

POORE, *pôr*, BEN PERLEY: journalist: 1820, Nov. 2—1887, May 30; b. Newburyport, Mass. He learned the printer's art while a boy, and from the age of 18 to 20 years edited a newspaper at Athens, Ga. He was an attaché of the U. S. legation at Brussels 1841, and remained in Europe till 1848, meanwhile acting as agent in collecting for the state of Massachusetts documents relating to American history. While abroad Poore was a correspondent of the Boston *Atlas;* after his return home, he edited the Boston *Bee,* and the Boston *Sunday Sentinel* till 1854. He then became, and continued till his death, a Washington correspondent, under the signature 'Perley.' In this work he won a national reputation. For several years he was clerk of the senate committee on printing records. In the civil war he served a while as major. He published numerous books—among them, *Rise and Fall of Louis Philippe* (1848); *Thirty Years in the National Metropolis* (1886); and a compilation of the treaties negotiated by the U. S. government with various foreign countries.

POOR MEN OF LYONS: in *chh. hist.,* name given to the Waldenses, who are said to have originated at Lyons.

POORE, HENRY RANKIN: American artist: b. Newark, N. J., 1859, March 21. He studied art at the National Academy of Design in New York and also at the Pennsylvania Academy of Fine Arts under Peter Moran. Later at Paris he was a pupil of Luminais and Bouguereau. He has devoted himself mainly to animal subjects, especially dogs, and among his canvases are: *The Plowing of the Ephrata Brethren* (1894); *Hounds in Winter* (1898); and *Clearing Land* (1903). He has published *Pictorial Composition and the Critical Judgment of Pictures* (1903).

POOR PRIESTS: in *chh. hist.,* name given to or assumed by the Lollard clergy of the 14th and 15th c., who wandered about the country holding what would now be called "revival meetings," or "missions," without the sanction of the bishop of the diocese.

POORT, n. *pôrt* [Dut. *poort,* a gate, a port-hole]: in *s. Africa,* an opening; a gate or pass.

POP, v. *pŏp* [imitative of the sound produced by a small explosion of air]: to make a small, smart, quick sound; to put out or in slyly or unexpectedly; to enter in or go out suddenly or unexpectedly; to offer or present with a sudden quick motion: N. a smart, quick sound or report: AD. suddenly; unexpectedly. POP'PING, imp. POPPED, pp. *pŏpt.* TO POP OFF, to disappear suddenly. POPGUN, a child's toy which drives out a pellet with a pop. TO POP THE QUESTION, familiarly applied to a man's asking a woman if she will marry him. POP-SHOP, *familiarly,* a pawnbroker's office.

POPAYAN, *pō-pâ-yân'* or *pō-pī-ân':* city of the United States of Colombia, S. America; in a fertile plain, 6,000 ft. above sea-level, on the Cauca, lat. 2° 27′ n. It was founded 1537, the first city built by Europeans in this region. Under the Spaniards, it rose to importance; but an earthquake 1834, and the continued unsettled state of the country, have reduced it. It is still of some consequence as a mart for agricultural produce. A great commercial road, about 1,000 m. in length, leads from Popayan to Truxillo, in Peru. Drinking water is plentifully supplied from the Ejido and Molina. The climate is remarkably mild because of an elevation above the sea of more than 5,250 feet. An episcopal city, Popayan has a college and a seminary for the training of priests. The products of its woolen mills and of the farms of the surrounding country are the main articles of commerce. Pop. 8,500.

POPE, n. *pōp* [L. and It. *papa,* a father: Gr. *pappas:* F. *pape*]: the bishop of Rome, head of the Rom. Cath. Chh., and formerly temporal as well as spiritual sovereign of that part of Italy called the States of the Church (see below): title also of all priests in the Greek and Russo-Greek Church. POPE'DOM, n. *-dŭm,* the office, dignity, or jurisdiction of the pope. POPERY, n. *pō'pėr-ĭ,* term of disparagement for the Rom. Cath. religion, or for its priestcraft. PO'PISH, a. *-pĭsh,* of or relating to the pope, or to the Rom. Cath. Chh. and its adherents; used offensively, or at least in disparagement of the most exaggerated doctrines and practices which Protestants attribute to Rom. Catholics in distinction from the tenets attributed to the more moderate of that church. PO'PISHLY, ad. *-lĭ.*

POPE, *pōp:* title of the Bishop of Rome, Supreme Pontiff of the Rom. Cath. Church. The present article explains briefly the titles of the Pope, the manner of his election, the nature and functions of his office, and the authority ascribed to him by the different schools of Rom. Catholics; and the chronological succession of the bishops of Rome from the earliest ages to this day.

1. The name 'Papa' (q.v.)—Latin equivalent of pope —was used originally of all bishops. The first known writer who applies it to the Roman bishop as his specific title is Ennodius of Pavia, latter part of the 5th c., who thus addresses Pope Symmachus. It is used also by Cassiodorus; and from his time gradually came to be reserved to this application, but it did not lose entirely its old and general use for many centuries later. In the modern ecclesiastical vocabulary, the pope is called the 'Sovereign Pontiff,' the 'Vicar of Christ,' the 'Head of the Church,' the 'Holy Father,' etc. He subscribes himself, since St. Gregory the Great, *Servus Servorum Dei* (Servant of the Servants of God); and he is addressed as Your Holiness, Your Beatitude, etc.

2. The office of pope is elective. The electoral body, according to present usage, is the College of Cardinals.

Primitively, the pope, like other bishops, was elected by the clergy and people, though the rights of both were not the same. Some elections having been attended with violence, the electoral body was by degrees limited. At length, by a decree of Pope Nicholas II. 1059, the right of election was vested in the cardinals (see CARDINAL). Provision was thus made for representation of all the ancient electoral bodies; the cardinal bishops representing the bishops of the Roman synod, the cardinal priests the parish clergy, and the cardinal deacons the heads of the popular electoral districts (*regiones*) of the city. Preparatory to an election, the cardinals are shut up in what is called 'the conclave,' all communication with the outer world being interrupted until the election shall have been made. A simple majority of voices does not suffice —two-thirds of the cardinals must vote for the same candidate. There are four modes of election—'scrutiny,' 'access,' 'compromise,' and 'inspiration.' Twice a day during the conclave, each cardinal deposits, in a chalice placed on the altar, the name of his candidate. If the requisite number of votes are not found for any one, the papers are at once burned; and the smoke of the burning votes is a signal to the expectant crowd outside that no election has taken place. This is called the 'scrutiny.' If votes be added to those already given for one candidate, so as to make the required two-thirds, it is called 'access.' If the cardinals of two parties unite, it is called 'compromise.' If, by a public movement, a particular candidate be carried as by acclamation, the election is said to be by 'inspiration': the recent pope, Pius IX., was elected in this way. The greater Rom. Cath. powers—France, Austria, and Spain—were formerly understood to have the privilege of placing a veto on the election of *one* candidate; but this right was vague and undefined, and had no formal foundation in law. After election the pope is enthroned, enters upon possession of his see, and finally is solemnly crowned.

3. The general nature of the office of the pope may be inferred from his being, according to the teaching of the Church, the successor of St. Peter, and vicegerent of Christ on earth, whence follow all the powers necessary for practical government of the church. Hence he is held (1) to possess over the entire church, and each of its parts, a supreme authority, not indeed arbitrary, but regulated by the law of God and by the canons. He has power (2) to examine and decide authoritatively all controversies; (3) to convoke councils; (4) to revise and confirm their decrees; (5) to issue general decrees, whether on discipline and morals, or on doctrine; (6) he is the center of communion, separation from which involves the forfeiture of the communion of the whole church; (7) he has *ultimate* authority to appoint bishops in all parts of the church, and however this right may be exercised in the first instance, as by the sovereign, by the

clergy, or by a synod of bishops, it rests with him to confirm episcopal elections, no matter how made, and to grant 'canonical institution;' (8) he can also deprive bishops, and set others in their place; and can even, in cases of great emergency, suppress bishoprics, and change their limits according to existing requirements; (9) he has authority to judge of the doctrine on faith and morals taught in particular books, or by particular individuals, and to pronounce authoritatively as to its conformity with the Catholic faith, or the contrary. This privilege formed the subject of the great controversy with the Jansenists as to what are called 'Dogmatic Facts.'—Also, see TEMPORAL POWER, ETC.

4. All Rom. Catholics are agreed that the pope, as primate, possesses, by Divine law and in virtue of his office, full governing authority over the entire church. Of the exercise of such power, they find traces in history from the earliest times. Rom. Cath. historians trace the history of the pope's primacy in St. Clement's Letters to the Church of Corinth; in the action taken by Victor in the Paschal controversy, and by Stephen and Cornelius in the controversy on rebaptizing heretics; in the deposition of Marcian, Bp. of Arles, at the instance of Cyprian, by Pope Stephen; in the leading part taken by the popes in the condemnation of Donatus and of the Palagian heresy; and perhaps more than all, in the appeals made from various parts of the church by persons excommunicated by their own bishops, and the rehearing at Rome of such causes, and the confirmation or reversal of the sentence according to the result of the trial. These several facts, however, though to Rom. Catholics they appear evidences of the papal supremacy, are explained by Prot. writers in a sense which does not suppose any permanent supremacy on the part of the Roman see, and which they hold to be reconcilable with the full independence of national churches; and it is admitted by Rom. Catholics themselves, while they contend that the instances to which they appeal imply a real exercise of primacy from the beginning, that the details of that primacy have undergone a gradual and extensive development in the progress of the church. Till the date of the late Vatican Council, great differences of opinion existed between the Gallican and the Ultramontane schools as to the extent and nature of the papal authority, whether in decrees of doctrine or in the government of the church. As to the former, all agreed that the judgment of the pope, in concert with the body of bishops, was infallible; but they differed as to papal decrees on doctrine issued by the pope alone, *ex cathedrâ,* and addressed to the whole church, though both agreed as to the duty of respectful obedience on the part of all, until the general sense of the church should have been ascertained; and should no reclamation on the part of the church take place, the decree of the pope was held to be, in the opinion of both schools, as infallible;

and the doctrine propounded therein was allowed to be recognized as a point of faith sanctioned with the ultimatum of infallibility: see GALLICAN CHURCH. But the Ultramontanes held that a doctrinal decree issued *ex cathedrâ* is infallible *ipso facto*, and independently of any reference to the church dispersed. As to the government of the church, the Ultramontanes held the P. supreme, and thus superior to general councils, and independent of their decrees. The Gallicans, on the contrary, held that a general council is superior to the P., and has power to bind him by its decrees. Further, the Ultramontanes held that the P. is the source of all jurisdiction in the church, and that the bishops derive their powers *through him* from Christ. The Gallicans regarded the episcopal power as received directly from Christ by virtue of the episcopal office (see EPISCOPAL SYSTEM: BISHOP). This difference of opinion led to many controversies of detail as to the respective rights and powers of the P. and the bishop in the several dioceses. On the question of infallibility and on all its practical consequences, the Ultramontane view, though not in its furthest extreme, received the sanction of the late Vatican Council.

5. The chronology of the papacy in the 1st c. is very obscure. The enumerations in ancient writers are imperfect, and they differ as to the exact order of succession. The two most ancient catalogues, those of Irenæus and Augustine, differ in more than one particular. The chief difficulty regards Linus and Cletus. The former is believed to have been vicegerent of Peter during the interval between his first coming to Rome and his final residence there. He would therefore have been at once the contemporary of Peter and his successor (though but for a very brief period). The difficulty as to Cletus arises from the doubt whether he be the same person with Anacletus. Subjoined is a catalogue of the Popes, or of those entitled Bishops of Rome, compiled from the most careful modern authorities, and arranged according to centuries:

	A.D.
FIRST CENTURY.	
The Apostle Peter	41–67
Linus	68
Cletus, or Anacletus	uncertain date
Clement I	uncertain date
SECOND CENTURY.	
Evaristus	about 100
Alexander I	about 109
Sixtus I., Roman	119
Telesphorus, Greek	127
Hyginus, Athenian	138
Pius I., native of Aquileia	142
Anicetus, Syrian	151
Soter, Greek	161
Eleutherus, Greek	170
Victor I., African	185
Zephyrinus	197
THIRD CENTURY.	
Callixtus I., Roman	217
Urban I., Roman	222
Pontianus, Roman	230
Antherus, Greek	235

	A.D.
Fabianus, probably Roman	236
Cornelius, Roman	252
(Novatianus, first antipope.)	
Lucius I., Roman	253
Stephen I., Roman	253
Sixtus II., Roman	257
Dionysius, Greek	259
Felix I., Roman	270
Eutychianus, uncertain	275
Caius, Roman	283
Marcellinus, Roman	296
FOURTH CENTURY.	
Marcellus I., Roman	308
(Marcellinus having died in 304 or 305.)	
Eusebius, Greek	310
Melchiades, African	310
Sylvester I., Roman	314
Marcus, Roman	336
Julius I., Roman	337
Liberius, Roman	352
(Felix II., antipope.)	
Damasus I., Spaniard	366
(Ursicinus, antipope.)	
Siricius, Roman	384
Anastasius I., Roman	398
FIFTH CENTURY.	
Innocent I., native of Albano	401
Zosimus, Greek	417
Boniface I., Roman	418
Celestinus I., Roman	422
Sixtus III., Roman	432
Leo I., Roman, called 'the Great'	440
Hilarius, native of Sardinia	461
Simplicius, native of Tibur	467
Felix III., Roman	483
Gelasius I., Roman	492
Anastasius II., Roman	496
Symmachus, native of Sardinia	498
SIXTH CENTURY.	
Hormisdas, native of Frusino	514
John I., Tuscan	523
Felix IV., native of Beneventum	526
Boniface II., Roman	530
John II., Roman	532
Agapetus I., Roman	535
Sylverius, native of Campania	536
Vigilius, Roman	540
Pelagius I., Roman	555
John III., Roman	560
Benedict I., Roman	574
Pelagius II., Roman	578
Gregory I., Roman, styled 'the Great'	590
SEVENTH CENTURY.	
Sabinianus, native of Tuscany	604
Boniface III., Roman	607
Boniface IV., native of Abruzzi	608
Deusdedit or Deodatus I., Roman	615
Boniface V., Neapolitan	619
Honorius I., native of Capua	625
Severinus, Roman	638
John IV., native of Dalmatia	640
Theodorus I., Greek	641
Martin I., native of Tudertum	649
Eugenius I., Roman	654
Vitalianus, native of Signia	657
Deusdedit II., Roman	672
Domnus I., Roman	676
Agathon, Sicilian	678

	A.D.
Leo II., Sicilian	682
Benedict II., Roman	684
John V., native of Syria	685
Conon, native of Thrace	686
Sergius I., native of Palermo	687
EIGHTH CENTURY.	
John VI., native of Greece	701
John VII., native of Greece	705
Sisinnius, native of Syria	708
Constantine, Syrian	708
Gregory II., Roman	715
Gregory III., Syrian	731
Zacharias, Greek	741
Stephen II.	753
Stephen III., Roman	753
Paul I., Roman	757
Stephen IV., Sicilian	763
Adrian I., Roman	772
Leo III., Roman	795
NINTH CENTURY.	
Stephen V., Roman	816
Paschal I., Roman	817
Eugenius II., Roman	824
Valentinus, Roman	827
Gregory IV., Roman	827
Sergius II., Roman	843
Leo IV., Roman	847
In this interval is placed the fabulous pope Joan (q.v.).	
Benedict III., Roman	855
Nicholas I., Roman	858
Adrian II., Roman	867
John VIII., Roman	872
Martin II. (called also Marinus I.)	882
Adrian III., Roman	884
Stephen VI., Roman	885
Formosus, Bishop of Porto	891
(Sergius and Boniface VI., antipopes.)	
Stephen VII., Roman	896
Romanus, Tuscan	897
Theodorus II., Roman	897
John IX., native of Tibur	897
TENTH CENTURY.	
Benedict IV., Roman	900
Leo V., native of Ardea	903
(Christopher, antipope.)	
Sergius III	904
Anastasius III., Roman	911
Lando, native of Sabina	913
John X., Roman	914
Leo VI., Roman	928
Stephen VIII., Roman	929
John XI.	931
Leo VII., Roman	936
Stephen IX., Roman	939
Martin III. (called by some Marinus II.)	943
Agapetus II.	946
John XII., Ottaviano Conti	956
He was the first who changed his name on his elevation.	
(Leo VIII., antipope)	963
Benedict V., Roman	964
John XIII., Roman	965
Benedict VI	972
Domnus II., Roman	973
Benedict VII. (Conti), Roman	974
John XIV	983
(Boniface VII., Franco, antipope.)	
John XV., Roman	985
John XVI., Roman	986
Gregory V., German	996
Sylvester II., Gerbert, native of Auvergne	999

POPE.

ELEVENTH CENTURY. A.D.

John XVII. (May—October) 1003
John XVIII., Roman 1003
Sergius IV., Roman 1009
Benedict VIII., native of Tusculum 1012
John XIX., Roman (in some catalogues reckoned XX.; the diversity arising from a disputed election) 1024
Benedict IX 1033
(Sylvester, antipope.)
Gregory VI., Roman 1044
Clement II., native of Saxony 1047
Damasus II. (Poppo) 1048
Leo IX., Bishop of Toul 1049
Victor II., Bishop of Eichstadt 1055
Stephen X., Frederick, Abbot of Monte Casino 1057
Benedict X., by some styled antipope, abdicated 1058
Nicholas II., native of Burgundy 1059
Alexander II., native of Milan 1061
Gregory VII., Hildebrand, native of Tuscany 1073
(Guibert, antipope, assumed the name of Clement III.)
Victor III., native of Beneventum 1086
Urban II., native of France 1088
Paschal II., native of Tuscany 1099
(Albert and Theodoric, antipopes.)

TWELFTH CENTURY.

Gelasius II., native of Caieta 1118
Callixtus II., native of Burgundy 1119
Honorius II., Cardinal Lamberto, Bishop of Ostia 1124
Innocent II., Roman 1130
(Anacletus, antipope.)
Celestinus II., Tuscan 1143
Lucius II., native of Bologna 1144
Eugenius III., native of Pisa 1145
Anastasius IV., Roman 1153
Adrian IV., Nicholas Breakspeare, Englishman 1154
Alexander III., Cardinal Orlando Bandinelli, native of Siena 1159
(Victor, Paschal, and Callixtus, antipopes.)
Lucius III., Cardinal Ubaldo of Lucca 1181
Urban III., Uberto Crivelli, Archbishop of Milan 1185
Gregory VIII., native of Beneventum 1187
Clement III., Paul, Bishop of Prænestc 1188
Celestinus III., Cardinal Hyacinthus, Roman 1191
Innocent III., Cardinal Lotharius, native of Signia 1198

THIRTEENTH CENTURY.

Honorius III., Cardinal Savelli, native of Rome 1216
Gregory IX., Cardinal Hugo, native of Anagni 1227
Celestinus IV., native of Milan 1241
Innocent IV., Cardinal Sinibaldo Fieschi, native of Genoa 1242
Alexander IV., Cardinal Rinaldo Conti, native of Anagni 1254
Urban IV., James, Patriarch of Jerusalem, Frenchman 1261
Clement IV., Guy, native of St. Gilles, in Languedoc 1265
Gregory X., Tebaldo Visconti, native of Piacenza 1272
Innocent V., Cardinal Peter, native of Tarentaise 1276
Adrian V., Ottobono Fieschi, native of Genoa 1276
John XXI., native of Lisbon 1276
Nicholas III., Cardinal Orsini, native of Rome 1277
Martin IV., Cardinal Simon de Brie, Frenchman 1281
Honorius IV., Cardinal James Savelli, native of Rome 1285
Nicholas IV., Cardinal Jerome, native of Ascoli 1288
Celestinus V., Pietro da Morrone of Abruzzi 1294
Boniface VIII., Cardinal Benedetto Gaetani, native of Anagni 1295

FOURTEENTH CENTURY.

Benedict XI., Cardinal Nicholas, native of Treviso 1303
Clement V., Bertrand of Bordeaux, removed the papal see to Avignon 1305
John XXII., James, native of Cahors, in France 1316
(Nicholas, antipope.)
Benedict XII., James Fournier, Frenchman 1334
Clement VI., Peter Roger, native of Limoges, in France 1342

POPE.

	A.D.
Innocent VI., Stephen Aubert, native of Limoges	1352
Urban V., William Grimoard, Frenchman	1362
Gregory XI., Peter Roger, Frenchman, restored the papal see to Rome	1370
Urban VI., Bartolomeo Prignano, Neapolitan	1378
(From 1378 to 1410 occurs the great Western Schism, during which, in conflict with the line of popes inserted in the catalogue, is found a rival line residing at Avignon—Clement VII., 1378-1394; Benedict XIII., 1394-1410. The Council of Pisa, 1410, deposed both rival popes; but Benedict XIII. remained in schism till his death in 1424.)	
Boniface IX., Peter Tomacelli of Naples	1389

FIFTEENTH CENTURY.

Innocent VII., Cosmo Migliorati, native of Sulmona	1404
Gregory XII., Angelo Corrari, native of Venice	1406
Alexander V., Peter Philargius, native of Candia	1409
John XXIII., Cardinal Cossa, deposed by the Council of Constance	1410
Martin V., Otho Colonna, Roman	1417
Eugenius IV., Gabriel Condulmero, Venetian	1431
(Felix, antipope.)	
Nicholas V., Cardinal Thomas, native of Sarzana	1447
Callixtus III., Alfonso Borgia, Spaniard	1455
Pius II., Æneas Sylvius Piccolomini, native of Siena	1458
Paul II., Peter Barbo, native of Venice	1464
Sixtus IV., Francis della Rovere, Genoese	1471
Innocent VIII., Gian Battista Cibo, Genoese	1485
Alexander VI., Rodrigo Lenzoli Borgia, Spaniard	1492

SIXTEENTH CENTURY.

Pius III., Francis Todeschini Piccolomini	1503
Julius II., Julian della Rovere, Genoese	1503
Leo X., Giovanni de' Medici, son of Lorenzo the Magnificent	1513
Adrian VI., native of Utrecht	1522
Clement VII., Giulio de' Medici, nephew of Lorenzo	1523
Paul III., Alessandro Farnese, native of Rome	1534
Julius III., Giovan Maria Giocci, native of Rome	1550
Marcellus II., Cardinal Cervini, native of Montepulciano	1555
Paul IV., Gianpietro Caraffa, Neapolitan	1555
Pius IV., Giovanni Angelo Medichini, native of Milan	1559
Pius V., Michele Ghislieri, native of Alessandria	1566
Gregory XIII., Hugo Buoncompagni, native of Bologna	1572
Sixtus V., Felice Peretti of Montalto, native of the March of Ancona	1585
Urban VII., Gian Battista Castagna, Genoese	1590
Gregory XIV., Nicola Sfrondati, native of Milan	1590
Innocent IX., Gian Antonio Facchinetti, native of Bologna	1591
Clement VIII., Ippolito Aldobrandini, native of Fano	1592

SEVENTEENTH CENTURY.

Leo XI., Alessandro de' Medici, native of Florence	1605
Paul V., Camillo Borghese, native of Rome	1605
Gregory XV., Alessandro Ludovici, native of Bologna	1621
Urban VIII., Maffeo Barberini, Florentine	1623
Innocent X., Gian Battista Pamfili, native of Rome	1644
Alexander VII., Fabio Chigi, native of Siena	1655
Clement IX., Giulio Rospigliosi, native of Pistoia	1667
Clement X., Emilio Altieri, native of Rome	1670
Innocent XI., Benedetto Odescalchi, native of Como	1676
Alexander VIII., Pietro Ottoboni, native of Venice	1689
Innocent XII., Antonio Pignatelli, native of Naples	1691

EIGHTEENTH CENTURY.

Clement XI., Gian Francesco Albani, native of Urbino	1700
Innocent XIII., Michael Angelo Conti, native of Rome	1721
Benedict XIII., Vincenzo Maria Orsini, native of Rome	1724
Clement XII., Lorenzo Corsini, native of Florence	1730
Benedict XIV., Prospero Lambertini, native of Bologna	1740
Clement XIII., Carlo Rezzonico, native of Venice	1758
Clement XIV., Gian Vincenzo Ganganelli, born near Rimini	1769
Pius VI., Angelo Braschi, native of Cesena	1775

NINETEENTH CENTURY.	A.D.
Pius VII., Gregorio Barnaba Chiaramonti, native of Cesena....	1800
Leo XII., Annibale della Genga, native of Romagna.....	1823
Pius VIII., Cardinal Castiglioni, native of Congoli	1829
Gregory XVI., Mauro Cappellari, native of Belluno	1831
Pius IX., Giovanni Maria Mastai-Ferretti, native of Sinigaglia..	1864
Leo XIII., Gioacchimo Pecci, native of Carpineto	1878
Pius X., Giuseppe Sarto, native of Riese.....	1903

Protestants generally object to the list of popes given by Rom. Catholics, that there is no conclusive evidence of the apostle Peter's ever having even been in Rome; though most of them admit the probability that he was there, and suffered martyrdom there. But they deny that there is any evidence whatever of his having exercised the office of bishop, in the diocesan or prelatical sense, either there or anywhere else. They call in question many other names and dates in the earlier part of the list, not so much disputing the existence of the persons named, as their exercise of the office of bishop in Rome, and still more their right to be considered bishops *of* Rome. According to Protestants in general, the papacy grew by a gradual assumption of power out of an ordinary bishopric, through the advantage of metropolitan position and influence, and was afterward supported by the fable—as they deem it—of the see of St. Peter.—See ROMAN CATHOLIC CHURCH: VATICAN, COUNCIL OF THE: EPISCOPACY: BISHOP: PRESBYTERIANISM: CONGREGATIONALISM.

POPE (fish): see RUFFE.

POPE, ALEXANDER: English poet: 1688, May 22—1744, May 30; b. London. His parents were Rom. Catholics, and to this faith the poet also nominally adhered, thus debarring himself from public office and employment. His father, a linen-merchant, saved a moderate competency, and received some accession of fortune by his marriage with Edith Turner, his second wife, and the poet's mother, a lady of a good Yorkshire family. He then withdrew from business, and settled on a small estate at Binfield in Windsor Forest: he died at Chiswick 1717. Soon after his death his son Alexander took a long lease of a house and five acres of land at Twickenham, on the banks of the Thames, whither he retired with his widowed mother, to whom he was tenderly attached, and where he resided till his death, cultivating his little domain with taste and skill, and embellishing it with a grotto, temple, wilderness, and other adjuncts poetical and picturesque. In this famous villa, P.—the most popular and successful poet of his time—was visited by Frederick, Prince of Wales, and by the most celebrated wits, statesmen, and beauties of the day. P.'s early years were spent at Binfield, within the range of the Royal Forest. He received some education at little Rom. Cath. schools, but was his own instructor after his 12th year. He never was a profound or accurate scholar, but he read the Latin poets with ease and delight, and acquired some Greek, French, and Italian. He was a poet almost from infancy; he 'lisped in numbers,' and when a mere youth, surpassed all his contemporaries in metrical harmony and correctness. His pastorals and some translations appeared

in Tonson's *Miscellany*, 1709; but were written three or four years earlier. These were followed by the *Essay on Criticism*, 1711; *Rape of the Lock* (when completed, the most graceful, airy, and imaginative of his works), 1712–14; *Windsor Forest*, 1713; *Temple of Fame*, 1715. In a collection of his works 1717, he included the *Epistle of Eloisa*, and *Elegy on an Unfortunate Lady*, two poems inimitable for pathetic beauty and finished melodious versification. 1715–26, P. was engaged chiefly on his translations of the *Iliad* and *Odyssey*, which, though wanting in true Homeric simplicity, naturalness, and grandeur, are splendid poems. They brought to the fortunate and popular translator about £8,000. He next set forth an edition of Shakespeare which was unworthy of his reputation. 1728–9, he published his greatest satire—the *Dunciad*, an attack on all poetasters and pretended wits, and on all other persons against whom the sensitive poet had conceived any enmity. In 1737 he gave the world a volume of his *Literary Correspondence*, containing some pleasant gossip and observations, with choice passages of description; but it appears that the correspondence was manufactured for publication, not composed of actual letters addressed to the parties whose names are given, and the collection was introduced to the public by means of an elaborate stratagem on the part of the scheming poet. 1731–39 he issued a series of poetical essays, moral and philosophical, with satires and imitations of Horace, all admirable for sense, wit, spirit, and brilliance. Of these delightful productions, the most celebrated is the *Essay on Man*, to which Bolingbroke is believed to have contributed the spurious philosophy and false sentiment; but its merit consists in detached passages, descriptions, and pictures. A fourth book to the *Dunciad*, containing many beautiful and striking lines, and a general revision of his works, closed the poet's literary cares and toils: he died 1744, and was buried in the church at Twickenham. P. was of very diminutive stature, and deformed from his birth. His physical infirmity, susceptible temperament, and incessant study, rendered his life 'one long disease.' He was, as his friend, Lord Chesterfield, said, 'the most irritable of all the *genus irritabile vatum*, offended with trifles, and never forgetting or forgiving them.' His literary stratagems, disguises, assertions, denials, and (we must add) misrepresentations, would fill volumes. Yet P., when no disturbing jealousy, vanity, or rivalry intervened, was generous and affectionate, and he had a manly, independent spirit. As a poet, he was deficient in originality and creative power, and thus was inferior to his prototype, Dryden; but as a literary artist, and brilliant declaimer, satirist, and moralizer in verse, he is still unrivalled. He is the English Horace. Of the many lives, that by Carruthers is one of the best (1857); see also that by Leslie Stephen (1880).

POPE, John: 1799, Dec. 17—1876, Jan. 14; b. Sandwich, Mass.: naval officer. He was appointed midshipman from Maine and was promoted lieut., commander, and captain. As lieut. he served in the Mediterranean, W. India, and Brazil squadrons. He commanded the brig *Dolphin* on the African coast, and the *Vandalia* in the E. Indies, and was in charge of the Boston and Portsmouth navy-yards successively 1850–60. In 1861 he commanded the steam-sloop *Richmond* of the Gulf squadron, but was retired in Dec. of that year.

After his retirement he was prize commissioner and light-house inspector at Boston. Of his 45 years of naval service, 27 were spent at sea, the remainder on shore duty. He died at Dorchester, Mass.

POPE, John: soldier; 1822, Mar. 16—1892, Sep. 23; b. Louisville, Ky.; graduated at West Point and was assigned to the engineer corps 1842. He served in Fla. 1842–44. In the Mexican war he won the brevets of 1st lieut. and capt.; headed an exploring expedition in Minn. 1849; was engaged in topographical engineering work in N. Mex. 1851–53; and had charge of the survey of the route for the Pacific r.r., and of other surveys in Texas, 1853–56. At the outbreak of the civil war he was capt., and was appointed brig.gen. of volunteers 1861, with command of s.w. and central Mo.; there he broke the Confederate strength under Gen. Price. He commanded the land forces in the expedition against New Madrid and Island No. 10, and for his skill and gallantry received the rank of maj.-gen. of volunteers, with assignment to command of the Army of the Mississippi. After the fall of Corinth he pursued the retreating enemy to Baldwin, Miss. P. was then appointed brig.gen. in the regular army, and called east to take command of the army of Virginia. His command met reverses; P. had to retreat before a superior force of the enemy and fell back within the fortifications of Washington. At his own request he was relieved of the command of the army of Virginia, and assigned to the dept. of the northwest. P. was commissioned maj.gen in the regular army 1882, and was in command of the dept. of the Pacific at his retirement from the service, 1886.

POPE JOAN: fanciful name for a game at cards.

POPERINGHE, *po-pĕr-ăng':* old commercial town of Belgium, province of W. Flanders, four m. from the French frontier. The town has manufactures of lace, linens, and woolen cloths. Pop. 11,000.

POPE'S EYE: fanciful name for the fatty gland in the thick of the thigh of a sheep or an ox; a delicate morsel of food.

POPHAM, *pŏp'am*, George: colonist: about 1550–1608, Feb. 5; b. Somersetshire, England; bro. of Sir John P., lord chief-justice of the king's bench. He and Sir Ferdinando Gorges were patentees of a large tract of land in the present state of Maine, and P., with 100 men and two ships—one of which he commanded, the other commanded by Raleigh Gilbert, nephew of Sir Walter Raleigh—sailed

from Plymouth, England, 1607, May 31. They landed at the mouth of the Sagadahoc, now Kennebec, 1607, Aug. 15, and at once began building a store-house and fort. The latter they named Fort George. This was the first attempt at English settlement in New England. The vessels returned home Dec. 5, leaving a colony of 45 persons, of which P. was president and Gilbert admiral; but P. lived only until Feb. 5 of the next year; and the colonists, discouraged at the severity of the climate, soon afterward returned to England.

POPINJAY, n. *pŏp'ĭn-jā* [It. *pappagallo;* Sp. *papagayo;* OF. *papegay*, a parrot: F. *papegai, papegaut; lit.*, the talking-cock—from Bav. *papeln*, to babble, to chatter; *pappel*, a parrot, and F. *gau;* It. *gallo;* L. *gallus*, a cock]: a gay trifling fop; a prating coxcomb; a parrot; a mark, like a parrot, erected on a pole to be shot at. *Note.*—With *popinjay* Skeat compares the Lowland Scotch *bubbly-jock*, a turkey-cock—*literally*, a babble-jack.

POPINJAY, *pŏp'ĭn-jā:* a name of the Green Woodpecker (*Picus viridis*), bird common in most of the wooded districts of England and Scotland: see WOODPECKER.

POPISH PLOT, *pōp' ĭsh plŏt:* imaginary plot, on the part of the Rom. Catholics in England during the reign of Charles II., the object of which was believed to be a general massacre of the Protestants: see OATES, TITUS.

POPLAR, n. *pŏp'lĕr* [Ger. *pappel;* L. *populus;* F, *peuplier*, the poplar], (*Populus*): genus of trees, forming, with willows, the whole of the nat. order *Salicaceæ* or *Salicineæ* (by some regarded as a sub-order of *Amentaceæ*). and having diœcious flowers arranged in catkins, both male and female flowers with oblique cup-shaped perianth. The seeds have silky hairs, as in willows, and are readily wafted about by the wind. The species are numerous, natives chiefly of the temperate and cold regions of the n. hemisphere. They are large trees of rapid growth, with soft wood; and broad, heart-shaped, ovate, triangular, or lozenge-shaped, deciduous leaves, on rather long stalks. Many of them are very beautiful trees. The catkins appear long before the leaves, and proceed from distinct lateral buds. Few of the poplars are of much value for their timber, which is generally white, soft, and light; but from their rapid growth, they are useful as yielding firewood, and they are planted often as ornamental trees, producing an immediate effect of embellishment in a bare situation more readily than almost any other kind of tree. Besides the species known by the name Aspen (q.v.), or Tremulous Poplar, the following seem most worthy of notice. The WHITE P., or ABELE, often called in N. Amer. the SILVER LEAF P. (*P. alba*), native of s. Europe, a tree of 80 ft. or upward; with fine spreading head; and roundish, heart-shaped, lobed, and toothed leaves, which are smooth, shining, and dark-green above, downy and silvery-white beneath. The wood is used by cabinet-makers, turners, and toy-makers. It is little liable to swell or shrink, which adapts it for various purposes. The tree

loves low situations and clay soils.—The GRAY P. (*P. canescens*) of central and s. Europe, is very similar to the White P., but of more vigorous growth, a large spreading tree; the leaves similar to those of the White P., but not so dark-green above or so white beneath. It is not of so rapid growth as the White P.; and its wood is harder and better. The tree generally begins to rot in the heart when 40 or 50 years old. Like most of the other poplars, it fills the ground around it with suckers.—The BLACK P. (*P. nigra*), native of most parts of Europe, and formerly supposed to be indigenous in N. Amer., is 50–80 ft. high, with ample spreading head, viscous leaf-buds, and deltoid or unequally quadrangular, perfectly smooth leaves. The wood is used for the same purposes as that of the White and

Black Poplar (*P. nigra*).

Gray Poplars. The 'cotton' from the seeds has been used in France and Germany for making cloth hats and paper; but not profitably.—The LOMBARDY P. (*P. fastigiata* or *dilatata*) is perhaps a mere variety of the Black P., with erect instead of spreading branches. It appears to have been introduced into Europe from the East. It is very common in the Punjab and in Persia, and now also in Lombardy and other parts of Italy. It attains a height of 100, or even 150 ft., and is remarkable for erect form, contracted head, and very rapid growth. It is often planted as an ornamental tree, though not so generally as in the end of the 18th c., when it was thought preferable for ornamental purposes to every other tree. It is common in the streets and squares of towns in parts of Europe, and is seen in many smaller towns in the middle and e. United States; and is particularly adapted to situations where a long horizontal line of any kind fatigues the eye, or as seen starting up from a mass of lower wood or shrubbery, but

has a besom-like appearance when planted in unsuitable situations. The wood is of almost no value. It is propagated generally by layers.—The Downy P. (*P. heterophylla*), of swamps, from New Eng. to Ill. and s., has the leaf-lobes so over lapping as to conceal the end of the stalk; the leaves are woolly only when young.—The Balsam P., or Tacamahac (*P. balsamifera*), a common ornamental tree in Britain, is a native of N. America and of Siberia, and has whitish ovate-oblong leaves, which in spring are of delicate yellow tint, and have agreeable fragrance. The leaf-buds are viscid. The erect fastigiate manner of growth

Lombardy Poplar (*P. fastigiata*).

approaches that of the Lombardy Poplar. The resinous exudation of the buds (*Tacamahac*) is said to be diuretic and antispasmodic; and an ointment made from the buds is used for tumors, wounds, and burns. The resinous exudation of the buds of other species, as the Black P., possesses similar properties. A variety (*candicans*) of the Balsam P. is known as the *Balm of Gilead*, with leaves broader and more or less heart-shaped.—The Cotton-wood (*P. monilifera*) of N. America, particularly abundant on the upper parts of the Mississippi and Missouri, is valued for little except fire-wood when felled; as a tall tree it nobly relieves the flatness of prairie scenery; and it is only the green-catkined (pistillate) trees that give off the troublesome cottony down—not the staminate trees with smaller, red catkins. Another species is the Angled Cotton-wood, with the branch-bark 'winged.' In size of leaf, no other species equals *P. heterophylla*, native of the southern states, whose leaves are often six inches long.

POPLIN, n. *pŏp'lĭn* [F. *popeline:* of uncertain origin]: a cloth made of silk and worsted, of many varieties. In the 15th c. a fabric was woven in Avignon, France, called *papeline,* made of silk, and much esteemed. An attempt to imitate it was introduced into England, and the name was corrupted to *poplin,* which has since been adopted in other countries. In 1775 the manufacture was introduced into Ireland by French Prot. refugees, and from that time Irish poplins have been famous. What the exact nature of the original *popelines* was, is not certainly known; but the best modern poplins consist of a warp of silk and a weft of worsted, which gives substance combined with great softness and elasticity to the material It has a corded structure, like rep. Cotton, and even flax yarns, are substituted for silk, wholly or partially, in making cheap goods, which are far inferior in beauty to the true poplins.

POPLITEAL, a. *pŏp'lĭ-tē'ăl,* or POPLIT'IC, a. *-lĭt'ĭk* [L. *poples* or *poplĭtem,* the ham of the knee]: in *anat.,* pertaining to the ham or backpart of the knee-joint.

POPOCATEPETL, *pō-pō-kât-ā-pā'tl* [Aztec. *popoca,* to smoke, and *tepetl,* a mountain]; or in Spanish, *Volcan Grande de Mexico,* Grand Volcano of Mexico: mountain about 45 m. s.e. of the city of Mexico. It rises in the form of a cone 17,523 ft. above sea-level; regarded as one of the three highest mountains in N. America (see ST. ELIAS, MT.); and is composed chiefly of andesite, with much porphyritic obsidian. Forests girdle its lower parts; but at an elevation of 13,000 ft. all vegetation ceases. The snow limit is at about 15,000 ft. The summit presents a vast crater 5,000 ft. across, with sheer depth of 2,000 ft. About the period of the Spanish conquest it was very active, but no eruption has been recorded since 1540. It still smokes, however. Cortes, conqueror of Mexico, attempted to reach its summit, but was prevented by the masses of snow that covered it. This feat was achieved first by Francisco Mantaño, one of Cortes's followers, who not only climbed to the top of the mountain, but had himself let down its crater, by means of ropes, about 450 ft. In 1827 it was again scaled by the brothers Glennie, who determined its altitude barometrically, and since then this laborious exploit has been several times performed, and even by ladies.

POPPET, n. *pŏp'pĕt* [another spelling of *puppet*]: a familiar term of endearment.

POPPETS, n. plu. *pŏp'pĕts* [a probable corruption of *props*]: pieces of timber placed perpendicularly to support a ship in the launching.

POPPLE, n. *pŏp'l* [W. *popple*]: in *Scot.,* corn campion or cockle; *Lychnis* (*Agrostemma*) *Githāgo,* ord. *Caryophyllācēæ.*

POPPY, n. *pŏp'pĭ* [F. *pavot*, a poppy—from L. *papāver*, a poppy], (*Papāver*): genus of plants of nat. order *Papaveraceæ*, having a calyx of two (or rarely three) sepals, which very soon fall off; a corolla of four (rarely six) petals; numerous stamens seated on a receptacle; the stigma crowning the germen, without a style, and in the form of 4–20 rays; the capsule opening by pores under the persistent stigma, imperfectly divided into cells by partitions as numerous as the rays of the stigma, but which do not reach the centre, the seeds extremely numerous. There are numerous species of P., mostly natives of Europe and Asia, some found even in far n. regions, but most of them in warmer temperate parts. They are rather large herbaceous plants, annual or perennial, mostly sprinkled with bristly hairs. They have a white milky juice; disagreeable narcotic odor, particularly when bruised; pinnatifid or bipinnatifid leaves, more rarely jagged or toothed leaves: and large showy flowers, which readily become double by cultivation. The capsules are curious from the manner in which they fling out their seeds when the plant is shaken by the wind; each capsule being somewhat like a round or oval pepper-box, with holes, however, not in the top, where rain might enter through them, but under the rim. By far the most important species is that known as the Opium P. (*P. sōmniferum*), called also the White P., and the Oil Poppy: see Opium. But the same species is important for the bland fixed oil of the seeds, and is much cultivated as an oil-plant. *P.-oil* is as sweet as olive oil, and used for similar purposes. It is exported in considerable quantities from India. The P. is extensively cultivated for it also in France, Belgium, and Germany. The use and manufacture of this oil were for a long time, during the 18th c., strictly prohibited in France, from a mistaken notion that it must partake of the narcotic properties of the milky juice of the plant. The seed, however, contains no opium or any narcotic principle, and was well known to the ancients as a pleasant article of food, fit to be eaten by itself or with bread. The oil expressed from it is perfectly wholesome, and is much used in France and elsewhere for food: fully one-half of the oil used for cooking and otherwise for alimentary purposes in France, is of this kind. The seeds yield about 40 per cent. of oil, and the oil-cake is useful for manure or for feeding cattle. The oil is sometimes used by painters and by soap-boilers; but it is not good for burning. In the cultivation of the P. for oil, the seed is often sown in autumn where the severity of winter-frosts is not feared; in more n. parts, it is sown in spring, and sometimes the seed is scattered on the snow with which the ground is covered. Being very small, it needs little or no harrowing. Early sowing is favorable to the size of the plant, and to abundance of produce. Hoeing and thinning are advantageous. An open but rich soil is best for the P.; and a sheltered situation is necessary, as in exposed situations much of the seed is scattered by the wind. The P. does not exhaust the land so much as colza, rape, and some other oil-plants. Har

THE POPPY.

vesting ought to begin when one-fourth of the capsules of each plant are open. It is accomplished by pulling the plants in such a manner as not to shake the seed out of the capsules, and tying them in sheaves, which are placed together in an erect or slightly sloping position, till the ripening of the capsules is completed, when the seed is taken out by shaking the capsules into a tub or on a cloth, great care being used to prevent any earth from the roots from being mixed with them. Some farmers in Flanders sow P. in alternate rows with carrots. The variety of P. chiefly cultivated as an oil plant has flowers of dull reddish color, large oblong capsules, and brownish seeds; but the white-flowered variety, with globular capsules and white seeds also is used.—The ORIENTAL P. (*P. orientale*), native of Armenia and the Caucasus, a perennial species, is often planted in gardens for its very large, fiery-red flowers. Its unripe capsules have an acrid, almost burning taste; but are eaten by the Turks, and opium is extracted from them.—Several species are local, rare in some places, and troublesome weeds in cornfields in other places apparently quite similar in climate. Among them is the CORN P. or COMMON RED P. (*P. Rhœas*), with bright red flowers, and deeply pinnatifid leaves. The petals are mucilaginous and slightly bitter; they have slight narcotic odor: and a syrup made of them is used sometimes as an anodyne in catarrhs and children's complaints; but they are more valued for the rich red color which they yield. A variety with double flowers is cultivated in flower-gardens, under the name *Carnation Poppy*. Among the ancients, the P. was sacred to Ceres.

Poppy-head.

The N. American species of P. are of other genera.—The PRICKLY or MEXICAN P. (*Argemone Mexicana*), with yellow flowers, rarely white, has spread from the far south.—The CELANDINE P. (*Stylophorum diphyllum*), has deep yellow flowers and bristly pods; it is found in woods, Penn. to Wis. and south.—The HORN P. (*Glaucium luteum*), with yellow flowers and juice, is from Europe.—The BLOOD-ROOT belongs to the P. family.

POP'PY-HEAD, in Architecture: carved ornament, used as a finial on top of bench-ends, etc. In early examples, it is a simple fleur-de-lis, but in late Gothic, this and other woodwork become very elaborately carved.

POPPY-OIL: one of the three fixed oils, used in painting.

POPULACE, n. *pŏp'ū-lās* [F. *populace*, the populace—from It. *populazzo*—from L. *pop'ŭlus*, the people]: the common people; the multitude; the mob. POP'ULAR, a. *-lėr* [F. *populaire*—from L. *populāris*, popular]. pertaining to the common people or to the public; suitable or pleasing to the public in general; plain; easily comprehended. POP'ULARLY, ad. *-lĭ* POPULARITY, n. *pŏp'ū-lăr'ĭ-tĭ*, the quality or state of being in favor with the public; the state of being beloved by the people. POPULARIZE, v. *pŏp'ū-lėr-īz*, to render pleasing and suitable to the people generally. POP'ULARIZING, imp. POP'ULARIZED, pp. *-īzd* POPULATE, v. *pŏp'ū-lāt*, to furnish or settle with inhabitants; to people. POP'ULATING, imp. POP'ULATED, pp. *-lā-tĕd*. POP'ULATOR, n. *-tėr*, one who populates. POP'ULA'TION, n. *-lā'shŭn* [F.—L.]: the act of peopling; the state of a country with reference to the number of inhabitants; inhabitants of any particular place, district, or country; the whole number of inhabitants. Population, scientifically studied, has reference to those general laws that govern the increase or decrease of the human race, and to the checks which modify them. The practical object of the investigation is to regulate the operation of the laws so as to promote the welfare of society. For an attempt in this direction, see MALTHUS. The subject is one which requires to be investigated under different heads. See VITAL STATISTICS. POP'ULOUS, a. *-lŭs*, thickly peopled; numerously inhabited. POP'ULOUSLY, ad. *-lĭ*. POP ULOUSNESS, n. *-nĕs*, the state of having many inhabitants as compared to the extent of country.—SYN. of 'populace': mob; crowd; people; commonalty; the vulgar; multitude; rabble.

POPULIN, or POPULINE, n. *pŏp'ū-lĭn* [L. *popŭlus*, the poplar (see also POPLAR)]: an alkaline substance found in the root-bark of the aspen, one of the poplar species.

POPULIST (or PEOPLE'S) PARTY: see POLITICAL PARTIES.

PORBEAGLE, n. *pŏr'bē-gl*, or PROBEAGLE, *prō'bē-gl* [Dut. *pole;* Eng. *poll*, a head, and Eng. *beagle*, a small kind of hound tracking by scent]: a species of shark.

PORCATE, a. *pŏr'kāt*, or POR'CATED, a. [L. *porca*, a ridge between two furrows]: ridged; formed in ridges.

PORCELAIN, n. *pawrs'lān* [F. *porcelaine*—from It. *porcellana*, china-ware, so called from its resembling the enamel of the *porcellana*, known as the tiger or Venus's shell]: finest species of earthenware, white and semi-transparent, originally imported from China and Japan; china-ware (see POTTERY): ADJ. belonging to or resembling porcelain. PORCELLANEOUS, a. *pawr'sėl-lā'nē-ŭs*, of or resembling porcelain. PORCELAINIZED, a. *pawrs'lān-īzd*, in *geol.*, baked like potter's clay—applied to those clay shales and stratified rocks that have been converted by subterranean heat into a substance resembling in texture porcelain or kiln-baked clay. POR'CELANITE, or POR'CELLANITE, n. *-sĕ-lā-nīt*, a term applied to a clay or shale which has been converted by heat into a porcelain-like mass, varying in colors and degrees of hardness. PORCELAIN-CLAY, a clay, generally composed of alumina and silica, used in

making porcelain. *Note.*—The It. *porcellana* is evidently derived from *porcella*, a sow-pig, as the curved shape of the shell's upper surface resembles the raised back of a pig.

PORCH, n. *pōrch* [F. *porche*, a porch—from L. *porticus*, a colonnade or porch—from *porta*, a gate: It. *portico*]: in *arch.*, a roof supported on pillars before a doorway; a covered passage before the principal doorway of a church; when so large as to be fitted up as a small chapel, it is termed a *galilee:* a portico, or covered or inclosed approach to a doorway of any building. In Elizabethan and mediæval architecture, the P. was very common in domestic architecture; and in churches, it was almost universal. In France many splendid porches or portals remain; they are among the most beautiful specimens of mediæval art. In

Porch of Aldham, Essex (1350).
(From Parker's *Glossary of Architecture.*)

England wooden porches, of picturesque structure, are common in the parish churches of the middle ages.

PORCINE, a. *pŏr'sīn* [L. *porcus*, a pig]: pertaining to swine or pigs.

PORCUPINE, n. *pŏr'kū-pīn* [It. *porco spinoso*, the pig with spines, a hedgehog, a porcupine: L. *porcus*, a pig; *spinosus*, thorny—from *spina*, a thorn], (*Hystrix*): genus of mammalia, of order *Rodentia*, family *Hystricidæ*. This family is remarkably characterized by an armature of spines, which, like those of the hedgehogs, are, as to structure, merely thick and strong hairs. The *Hystricidæ* are plantigrade; the fore-feet have four toes and a rudimentary thumb, the hind-feet have five toes. Their general aspect is heavy and pig-like, and they have a grunting voice. The muzzle is broad and blunt; the ears short and rounded; the incisors smooth and large, two above and two below; the molars eight above and eight below. The American porcupines have mostly but four toes, and live usually on trees. The CANADA P. (*Erethizon dorsatus*) has soft, dark fur

beneath the longer hoary hair, with white dark-pointed spines, which are barbed and sometimes produce fatal inflammation in the animals that venture to attack; but has no power to shoot the quills, as is sometimes said: the wounds are usually inflicted by a stroke of the tail. It lives on the bark of trees, which are killed by its gnawing. It nests in hollow trees, and hibernates in cold weather. The Indians color the quills, using them to embroider deerskin clothing, etc., and they are fond of the flesh of the P.—The YELLOW-HAIRED P. (*E. epizanthus*) is smaller, and occurs from the Missouri river to the Pacific.—The P. with prehensile tails are still more arboreal, and are found in Mexico and S. Amer.—The Old World P. live in burrows, have five toes, and longer, more narrow skulls, besides dental and other differences from the American.—The COMMON P. (*H. cristata*) is a native of s. Europe, of many parts of Asia, and of most of Africa. It is one of the largest of rodents, being two to three ft. in length, besides the tail, which is about six inches long. The hinder part of the head and the neck are furnished with a crest of long bristles, capable of being elevated or depressed at pleasure. The muzzle and limbs are covered with very short hair; the back and sides with spines, longest on the middle of

Porcupine (*Hystrix cristata*).

the back, where they are almost of the thickness of a goose-quill, and more than 12 inches long. The spines are supported by a slender pedicle, and they terminate in a sharp point; they are longitudinally striated, and are ringed with black and white, which gives a general gray color to the animal. Their ordinary position is flat, with the points directed backward; but when the animal is excited, they are erected, and it rolls itself up like the hedgehog, with spines pointing in every direction. The tail spines or quills are of singular structure, being open thin-sided tubes, about two inches long, supported upon slender flexible pedicles; and they make a sound by rattling together when the tail is shaken. The P. is said to rattle the spines of its body also when irritated, but this is doubtful. The statement has been made, that it throws off its spines or quills by a voluntary act, launching them

at its adversaries; but it has no such power, though it is possible that quills ready to come off may be detached in moments of excitement, and fly to a small distance with sufficient force to be annoying to a pursuer. The P.'s armor, however, is strictly defensive, and it seeks to turn its back, and thus the points of its spines to an enemy. It is a solitary and nocturnal animal. It burrows in the ground, and in winter becomes torpid. It feeds on roots, bark, fruits, and other vegetable substances, sometimes committing great depredations in gardens. The spines or quills of the P. are used for various purposes, and have a certain commercial value. It is chiefly sought on account of them; though its flesh is eaten, and was brought to the market of ancient Rome.—A larger species of P. (*H. leucurus*), with the quills of the tail quite white, is found in India, and other species inhabit different parts of the East. The ATHERURE, or TUFTED-TAILED P. (*Atherura fasciculata*), native of India and Malacca, differs from the true porcupines in the head and muzzle not being convex, in having the quills flattened like blades of grass, and those of the tail gathered into a tuft at the end of it.

POR'CUPINE ANT'-EATER: see ECHIDNA.

PORDENONE, *pōr-dā-nō'nā:* town of Italy, province of Udine, 40 m. n.n.e. of Venice, on a plain near the base of the Alps. Pop. 5,000.

PORE, n. *pōr* [F. *pore*, a pore—from L. *porus;* Gr. *poros*, a channel or passage—from Gr. *peraō*, I pass]: one of the very minute openings or interstices in the skin through which the perspiration or sweat passes to the surface; any minute opening or cell on the surface of an organized body. POROUS, a. *pōr'ŭs*, full of pores; light and spongy; opposed to *dense*. POR'OUSLY, ad. *-lĭ*. POR'OUSNESS, n. *-nĕs*, or POROSITY, n. *pōr-ŏs'ĭ-tĭ*, the state of having small interstices or holes; the opposite of *density*. PORITE, n. *pōr'īt*, a species of coral having the surface covered with shallow and small cells; a fossil coral.

PORE, v. *pōr* [Sw. *pora*, to work slowly: comp. Gael. *purr*, to push]: to look on steadily and minutely; to look close and long, as on a book or writing. POR'ING, imp. PORED, pp. *pōrd*.

POREBLIND, a. *pōr'blīnd:* OE. for PURBLIND.

PORGY, *pawr'gĭ:* name of various fish of the *Sparidæ* or Sheepshead family. About New York it is applied, as also Paugy (both a corruption of the Indian name *Mishcuppauog*) to *Stenotomus versicolor*, formerly confounded by some with *Sparus pagrus* of S. C., Fla., and s. Europe. In New Eng. it is known as Scup and Scuppaug. It is much prized as a food-fish, and the best weigh 2½–3 lbs., but sometimes 4 or more. There is a southern species, *S. Gardeni*, and the name P. is there applied to other fish of the same family, such as *Lagodon rhomboides*, and several species of *Calamus*, and even to the Porcupine Fish. On the coast of Or., the name P., altered to Pogy and Porgee, is given to a fish of the Surf-fish family (*Embiotocidæ*) which resembles somewhat the P. of the East.

PORIFERA, n. *pōr-ĭf'ĕr-ă* [L. *porus*, a pore; *fero*, I bear]: a class of animals, including the sponges, perforated in every part with minute orifices; the term *Spongiæ* is preferred by many naturalists (see SPONGE: ZOOLOGY). PORIF'ERAN, n. *-ăn*, one of the Porifera or group of animals comprising the sponges.

PORIFORM, a. *pōr'ĭ-fawrm* [L. *porus*, a pore; *forma*, shape]: resembling a pore or small puncture.

PORIME, n. *pōr'īm* [Gr. *porimos*, practicable—from *poros*, a ford, a passage]: in *geom.*, a theorem or proposition so easy of demonstration as to be almost self-evident.

PORISM, n. *pō'rĭzm* [Gr. *porisma*, a corollary—from *porizō*, I provide]: a kind of geometric proposition in high favor among ancient Greek mathematicians, but of which the notices that have come down to us are so few and meagre, that mathematicians have widely differed, and even yet are not agreed about what a P. really was. The ancient works in which porisms are mentioned are *Collectiones Mathematicæ* of Pappus, and *Commentarii* of Proclus. Dr. Robert Simson (q.v.) was the first to restore the probably original form of porisms. As defined by Playfair, 'a porism is a proposition affirming the possibility of finding such conditions as will render a certain problem indeterminate, or capable of innumerable solutions.' This definition seems to have had most general acceptance, at least with English mathematicians; though Chasles declared (1860) that he considered it unfounded. Good examples of porisms are given in Simson's *Opera Reliqua;* Playfair's, 'Origin and Investigation of Porisms' (*Trans. of Roy. Soc. of Edin.*, III.); Wallace's paper, 'Some Geometrical Porisms, etc.' (*Edin. Trans.*, III. etc.). PORIS'TIC, a. *-rĭs'tĭk*, or PORIS' TICAL, a. *-tĭ-kăl*, pertaining to or depending on a porism.

PORITE: see under PORE 1.

PORK, n. *pōrk* [F. *porc*, a hog, swine's flesh: It. *porco;* L. *porcus*, a pig]: the flesh of pigs or swine, either fresh or salted. PORKER, n. *pōrk'ĕr*, a young hog; a pig. PORK'LING, n. *-lĭng*, a young pig. PORKMAN, a butcher who deals in pork.—*Pork* forms a very large portion of the animal food of many nations, though it is not the most nutritive, as will be seen by the following comparison of the four principal kinds of flesh-food:

	Mineral Matter.	Gelatine.	Fibrine and Albumen.	Fat.	Water.
Veal,	4·5	7·5	9·0	16·5	62·5
Beef,	5·0	7·0	8·0	30·0	50·0
Mutton,	3·5	7·0	5·5	40·0	44·0
Pork,	1·5	5·5	4·5	50·0	38·0

It has qualities, however, which fit it for man's use in certain special conditions; its fatness makes it a very heat-giving food for cold and temperate climates; while it sur-

passes all other kinds of animal food in the ease with which it may be preserved by salting and drying. The quality of beef and mutton is seriously deteriorated when long kept, even under the best methods of curing; that of pork is decidedly improved, and when of good quality and well cured it develops a richness and delicacy of flavor in marked contrast with the dryness and insipidity of other salted meat. Hence the trade in pork is considerable in all countries where it is used, especially in the United States and Great Britain, where vast quantities are cured for supply of ships and the army, and for domestic use. The quantity of pork exported from the United States to Great Britain is prodigious. America has long furnished the chief supply of mess and common pork not only for the British army, navy, and mercantile marine, but also for those of most European nations. Next to America, Ireland, especially the neighborhood of Cork, furnishes the largest supply of cured pork; and London and Wiltshire, and other parts of England, furnish vast quantities of bacon and hams for general consumption. The appetite of swine being much more catholic than that of their daintier neighbors, the feeding of them answers the purposes of economy, and extends very materially the supply of food. This, it is true, is attended with considerable dangers. If care is not taken that the feeding of swine should be wholesome and cleanly, their flesh becomes tainted with disease and unfit for food. Unscrupulous breeders sometimes take advantage of their exorbitant and omnivorous appetite to make them consume the most disgusting offal, and even when their feeding is not conducted with this utter recklessness of consequences it is often less careful than is consistent with sound sanitary conditions. There is in fact no animal to the perfection of whose flesh as an article of diet careful attention to feeding is more indispensable. The swine was among the unclean animals forbidden to be eaten by the Mosaic law. It is still regarded by the Jews as specially typical of the unclean animals. The Egyptians, Arabians, and other eastern nations had similar opinions as to the use of pork. The operations of the Bureau of Animal Industry in the United States Dept. of Agriculture and of various state authorities have practically done away with foreign complaints against pork from the United States based on the alleged prevalence of trichinæ. Laws prohibitive of import of pork products from this country into Italy, Austria-Hungary, France, Germany, Greece, Turkey, and a few minor countries were mostly repealed 1891-2.

PORNIAL, a. *por'nĭ-ăl:* licentious; meretricious. PORNOCRACY, n. *-nŏk'ră-sĭ:* rule by harlots; dominant influence of profligate women. PORNOGRAPHY, n. *-nŏg'ră-fĭ:* (1) description of prostitutes and of prostitution as related to public hygiene; (2) licentious art or literature.

POROSITY [see PORE]: state of having small interstices. The term expresses the experimental fact that no kind of matter completely fills the space which it occupies; in other words, that all bodies are full of minute cavities or interstices, such as are illustrated on a large scale by a sponge. On the atomic theory, it is obvious that this must be the case, if the atoms of matter are spherical, or, indeed, if they have any form save one or two special ones, such as cubes or rhombic dodecahedrons. It is commonly asserted that all bodies must be porous, because they are compressible; but this is an assumption, since we have no reason to believe that matter is not *per se* compressible, independently of the existence of interstices. The Florentine academicians, in their attempts to compress water, proved the porosity of silver, by flattening a sphere of that metal, filled with water, and soldered. The water escaped through the pores of the silver, and stood in fine drops on its surface. The porosity of liquids is easily shown by mixing alcohol and water. The bulk of the mixture is considerably less than the sum of the bulks of the components, showing that these must in part have entered each other's pores. This property of matter is of great importance in natural phenomena, as it brings the molecular forces of capillarity into play: raising the sap in vegetables, allowing rain to sink into the ground, etc.

POROUS, POROUSLY, POROUSNESS: see under PORE 1.

PORPHYRIUS, *por-fĭr'ĭ-ŭs:* one of that series of ancient philosophers to whom is due the reformation of the Greek philosophy known as Neo-Platonism: 233—about 305; b. prob. at Batanea in Syria (the Bashan of Scripture). His original name was Malchus, Greek form of the Syro-Phœnician *Melech*, or king. The name by which he is known in history, *Porphyrius*, 'one clad in purple,' is but a Greek epithet intended as a sort of paraphrase of his name. He is said by Socrates the historian, and by St. Augustine, to have been originally a Christian; but this seems improbable, though it is certain that in his youth he was a hearer of Origen, or at least held some intercourse with him at Cæsarea in Palestine. What is more certain is, that he passed at a later time to Athens, where he studied rhetoric under Longinus. At Rome, whither he repaired soon after 260, he entered on his historic career. Here he became a scholar of the Neo-Platonist Plotinus (q.v.), with whom, as well as with another member of the same school, Amelius, P. entered into an animated controversy; but eventually adopted so fully the opinions of Plotinus, that he became himself, if not the leader of the school, at least the most trusted of the disciples of its master. After six years in Rome, he went to Sicily, where, according to St. Jerome, he wrote his treatise in 15 books against the Christians, now known only from the replies which it elicited, having been burned by order of Emperor Theodosius. From Sicily, he went to Carthage, and afterward to Athens; but eventually, Plotinus having died soon after P. left Rome, he returned to that city, where he continued to

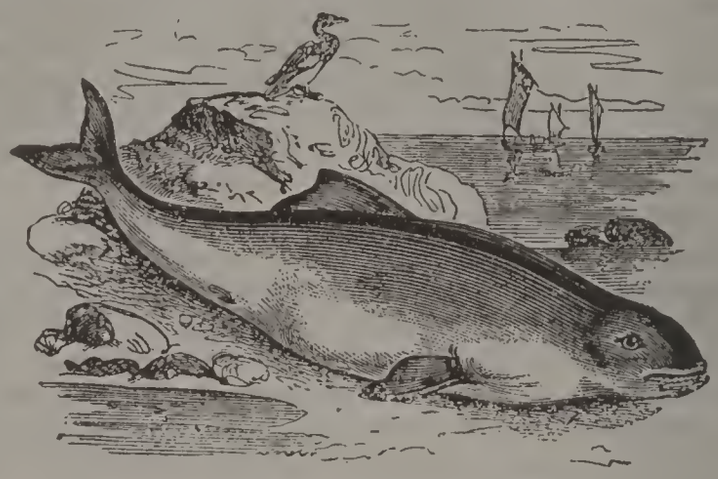
teach as it seems, until his death. For a view of P.'s position in the history of the Neo-Platonic school, see NEO-PLATONISTS. P. was a very voluminous writer. Of his works, the titles of more than 60 are preserved, 43 of which are entirely lost. His *Life of Pythagoras;* his work *On Abstinence from Animal Food;* his *Commentary on Aristotle's Categories,* with the *Introduction;* and *On the Harmonies* of Ptolemy; and the book *Ad Marcellam,* addressed to his wife, are preserved entire. The rest are known chiefly by fragments: no complete edition of his works has been published.

PORPHYROGENITUS, a. n. *pŏr'fĭr-ō-jĕn'ĭ-tŭs* [Gr. *porphu'rĕŏs,* purple—from *porphŭra,* purple dye; L. *genĭtus,* begotten]: born in or to the imperial purple; applied by the Romans of the Eastern Empire to sons of the emperors born after their accession to the throne. POR'PHYROGEN'ITISM, n. *-ĭ-tĭzm,* the principle of succession by which a younger son was preferred to the elder or first-born, merely from the fact of being born after the father's accession to the throne.

PORPHYRY, n. *pŏr'fĭ-rĭ* [Gr. *porphŭritēs;* L. *porphyrītēs,* a purple-colored precious stone—from Gr. *porphŭra,* purple dye: F. *porphyre,* porphyry]: term originally applied to a reddish igneous rock found in upper Egypt, used in sculpture, and known now as Rosso antico. It is composed, according to Delesse, of a red felspathic base, in which are scattered rose-colored crystals of the felspar called oligoclase, with some plates of blackish hornblende, and grains of oxidized iron ore. The term does not now, however, denote any particular rock, but it is applied to any rock which, like the Rosso antico, has a homogeneous earthy or compact base, through which are scattered distinct crystals of one or more minerals of contemporary origin with the base. Thus, gray volcanic trachyte often abounds in crystals of glassy felspar, forming a trachytic porphyry; or crystals of felspar, quartz, or calcareous spar, scattered through a base of greenstone, form a greenstone porphyry: similarly pitchstone porphyry, basaltic porphyry, claystone porphyry, etc. PORPHYRITIC, a. *pŏr'fĭ-rĭt'ĭk,* having the aspect or texture of porphyry. POR'PHYRA'CEOUS, a. *-rā'shŭs,* pertaining to porphyry. POR'PHYRIZE, v. *-rīz,* to cause to resemble porphyry. POR'PHYRIZING, imp. POR'PHYRIZED pp. *-rīzd.*

PORPOISE, n. *pŏr'pŭs,* or PORPESSE, n. *pŏr'pĕs* [O. It. *pesce-porco;* F. *porc poisson,* the hog-fish: mid. L. *porpecia,* a porpoise—from L. *porcus,* a hog; *pĭscis,* a fish], (*Phocæna*): genus of Cetacea, of family *Delphinidæ,* having a form similar to the dolphins, but the muzzle short, uniformly convex, and without a beak; a dorsal fin; the teeth very numerous, simple, and equal. The COMMON P. (*P. communis*) abounds on the w. coasts of Ireland and of Scotland; and is found on all the coasts of Europe n. of the Mediterranean, on the coasts of N. America, and in the arctic regions. It is one of the smallest of the Cetacea, its length sometimes not exceeding four ft., though individ-

uals occur six or even eight feet in length. The body is spindle-shaped; its greatest diameter is near the dorsal fin. The skin is perfectly smooth, and destitute of hair. There are 40 to 50 teeth in each jaw, not conical, as in most of the Cetacea, but compressed. The eye is rather small, and



Porpoise (*Phocœna communis*).

the pupil in the form of a V. The opening of the ear is very minute, like a hole made with a pin. The blow-hole is crescent-shaped, with the horns of the crescent directed forward, and is exactly above the eyes.

The P. is gregarious, and large numbers are often seen together, sometimes swimming in file, when their backs, appearing above the surface of the water, are apt to suggest the idea of a great sea-serpent; sometimes gamboling, either in fine weather, or when a storm is approaching, or even in the midst of a storm. The P. feeds on fish, which its teeth are admirably adapted to catch, and herds of porpoises pursue the vast shoals of herring, mackerel, etc., into bays and estuaries. The P. sometimes ascends rivers, apparently in pursuit of salmon, as far as the water is brackish, and is frequently itself caught on such occasions. It is an object of pursuit for its skin, its oil, and its flesh. The skin is nearly an inch thick, but is planed down until it becomes translucent, and is made into excellent leather, used for covering carriages and other purposes. Under the skin is a layer of fat, about an inch in depth, which yields oil of finest quality. The flesh is dark colored and bloody, but was in former times highly esteemed, and reckoned fit for the table of royalty, perhaps partly because among Rom. Catholics it was accounted *fish*. In the time of Queen Elizabeth, it was still used by the nobles of England, and was served up with bread-crumbs and vinegar. It is now used only in far n. regions, and is a chief dainty of the Greenlanders.—The Grampus (q.v.) is commonly referred to this genus.—Another species of P. (*P. Capensis*) is found near the Cape of Good Hope.

PORRACEOUS, a. *pŏr-rā'shŭs* [L. *porrăcĕŭs*, green—from *porrum*, a leek]: greenish; resembling the leek in color.

PORRECT, a. *pŏr-rĕkt'* [L. *porrec'tus*, reached out or extended—from *porrĭgo*, I extend]: in *bot.*, extending forth horizontally as if to meet something.

PORRIDGE, n. *pŏr'rĭj* [OF. *porée, porrée*, pottage made of beets and other herbs: It. *porrata*, leek-pottage—from L. *porrum*, a leek]: a kind of pudding made by slowly stirring oatmeal among water while boiling till a thickened mass is formed; a kind of broth. PORRIDGE-POT, the vessel in which porridge is made. PORRINGER, n. *pŏr'rĭn-jĕr* [from *porridge*]: a small earthenware or tin vessel out of which children eat their porridge—also called *pottenger*; in *OE.*, *porringer* is a word of contempt for a head-dress.

PORRIGO, n. *pŏr-rī'gō* [L. *porrĭgo*, the scurf]: *formerly*, any affection of the head where there were scabs: see FAVUS: RINGWORM.

PORSENNA, *por-sĕn'nâ* (or PORSENA, *por'sē-nâ*), LARS or LARTH (*Lar*, in Etruscan, means 'lord' or 'prince'): in the early and uncertain history of Rome, a powerful king of Clusium in Etruria, about B.C. 500. According to the legend told by Livy for history, when Tarquin the Proud was expelled from Rome, he sought the help, first of the Veii and the Tarquinii (his Etruscan kinsmen), against his revolted subjects; but their efforts not proving successful, he turned to P., who willingly espoused his cause, and marched a great army against Rome. The Etruscan king seized the Janiculum, a fortified hill on the w. side of the Tiber; and would have forced his way into the city across the 'Bridge of Wooden Piles' (*Pons Sublicius*), had not a brave Roman, Horatius Cocles, kept the whole of P.'s army at bay, while his comrades behind him hewed down the bridge; after which he plunged into the Tiber, and safely swam across its waves. P., we are informed, then laid siege to Rome; and after a while, the inhabitants began to suffer so severely from famine, that they resorted to a desperate expedient: 300 of the noblest Roman youths were to peril their lives in cutting off the Etruscan king. The first on whom the lot fell was C. Mucius, who stole into the camp of P., but not knowing the person of the king, killed his secretary instead. He was instantly seized, and put to the torture; but the unshrinking audacity with which he thrust his right hand into the fire and let it burn, moved the king so much, that he pardoned him; whereupon Mucius (ever afterward called *Scævola*, 'the Left-handed') told him of the jeopardy in which he was placed. P. resolved to make peace with Rome at once, and his conditions, which were not severe, being accepted by the sorely-pressed citizens, he withdrew his forces. This version of the story is wholly discredited by modern criticism, and is believed to have been invented by the patriotic annalists of ancient Rome to conceal the fact of a temporary Etruscan conquest; and the evidence for this view is overwhelming. Tacitus even expressly affirms that P. conquered the city Dionysius informs us that the senate sent him an ivory sceptre, a golden crown, and a triumphal robe, which was the form that had been adopted by the Etruscan cities

themselves of acknowledging the supremacy of the Roman king, Tarquinius Priscus; and Pliny mentions a fact quite conclusive as a proof of the subjugation of Rome—viz., that P. forbade the citizens to use iron, except for agricultural purposes. Niebühr, who has placed this view beyond all doubt, notices various minor incidents which are perfectly unintelligible, except on the hypothesis of an Etrucsan conquest. All the details of the ancient legend, therefore, may be regarded as fabulous—the product of patriotic unveracity—and what seems most reasonable to believe, is, that a great rising of the Etruscan against the Latin races took place, and that Rome, forming the Latin frontier toward Etruria, was exposed to the first brunt of the war, and suffered a disastrous defeat; but that shortly afterward the Etruscans themselves were decisively beaten, and forced back into their own territories; for after the conquest of Rome, Aruns, son of P., proceeded against Aricia, where (according to Livy) his army was routed under the walls of that city by the combined forces of the Latin cities, with the help of Greek auxiliaries from Cumæ. It is worth while quoting, as a proof of Niebühr's wonderful talent for felicitous conjecture, that he explains the long-surviving Roman custom of beginning an auction by offering for sale the goods of King P., by the supposition, that in the recovery of their independence, the Romans probably captured property belonging to their late master, which they may have publicly sold. The sepulchre of P. at Clusium is described by Varro, but his description is not credible. The ancient legend has been magnificently rendered in modern verse by Macaulay: see *Lays of Ancient Rome.*

PORSON, *por'son*, RICHARD: greatest Greek scholar that England has ever produced: 1759, Dec. 25—1808, Sep. 25; b. East Ruston, Norfolk, where his father was parish clerk. The curate of the parish conceiving a liking for the boy, on account of his omnivorous appetite for books and his marvellous memory, took charge of him, and had him educated with his own sons. For books, he had had only the few chance volumes found in his father's cottage. P. afterward found a patron in Mr. Norris (founder of the Norrisian professorship at Cambridge), who sent him to Eton 1774, where he remained four years, but did not gain any of the ordinary distinctions, though it is evident that there his mind acquired a fixed bias toward classical studies. Another patron, Sir George Baker, sent him, 1778, to Trinity College, Cambridge, of which he was elected a scholar 1780. Next year he won the Craven scholarship, subsequently, the first chancellor's medal. In 1782 he was chosen a fellow of Trinity. It was about this time that he began to give indications of his subtle sagacity and taste in the difficult verbal criticism of the Greek dramatists. For four years he contributed to Maty's *Review*—his first critique being on Schutz's Æschylus, and his finest on Brunck's Aristophanes. He also opened a correspondence with Prof. Ruhnken. If, however, we are to judge from a quatrain written at a later period of his life, he did more than correspond:

I went to Strasburg, where I got drunk
With that most learned Professor Brunck;
I went to Wortz, and got more drunken
With that more learned Professor Ruhnken.

In 1787 appeared, in the *Gentleman's Magazine*, his sarcastic letters on Hawkins's *Life of Johnson*. For the same periodical, he wrote his far more famous and trenchant *Letters to Travis on the Three Witnesses*. The dispute concerned the genuineness of John i. 7, 8, and was occasioned by a blundering and pretentious defense of the passage by Archdeacon Travis, against the scornful attack of Gibbon. P. naturally incurred great odium on account of the side which he took in this controversy. One old lady who had him in her will for a legacy of £300, cut it down to £30 when she heard that he had written what was described to her as a book against Christianity. In 1792 he resigned his fellowship, as he found that he could not conscientiously take orders in the church: the liturgy he could have signed heartily, but not the articles; and he would not dissemble. Some of his friends now raised a fund to preserve him from want, and about £100 a year was secured. He was also appointed to the regius professorship of Greek in the Univ. of Cambridge—an office, indeed, with emolument of only £40 a year; yet so splendid was his learning, so admirable his taste, so vigorous and epigrammatic his style of criticism, that he might easily—by a moderate degree of continuous literary labor—have gained a handsome income. But already 'two devils had him in their gripe'—proscrastination and a raging thirst for drink—and they held him firm to the end of his melancholy career. The only thing that he ever did in connection with his Greek professorship was to deliver a *prælectio* so excellent, that, it has been said, if he had passed from verbal to æsthetic criticism, he would have surpassed all his countrymen in that too. In 1794 he edited the plays of Æschylus for the Foulis press, Glasgow; and 1797–1801, four of Euripides—the *Hecuba*, the *Orestes*, the *Phœnissæ* and the *Medea*. He also collated the Harleian MS. of the *Odyssey* for the *Grenville Homer*. In 1806 he was appointed librarian of the 'London Institution' with a salary of £200; but was so grossly negligent of his duties, that the directors officially notified their dissatisfaction in these emphatic words: 'We only know that you are our librarian by seeing your name attached to the receipts for your salary.' P. had married 1796 Mrs. Lunan, who, if she had lived, might have aided him to resist his habit of drinking; indeed the marriage brought him into greater regularity of life. But the death of his wife five months after marriage, remanded him to his chambers in the Temple and his old habits. He died of apoplexy, in the 49th year of his age, and was buried with great pomp in the chapel of Trinity College, Cambridge. P.'s rage for drink was fearful. He would pour anything down his throat rather than endure the 'terrible torture of thirst.' Ink, spirits of wine for the lamp, an embrocation, are among the horrible things he is reported to have swallowed in his extremity. 'He used to return

to the dining-room after the company had left it; pour into a tumbler the drops remaining in the wine-glasses, and drink off the collectanea.' In fact, his thirst was so outrageous, that P. cannot be considered a mere wilful drunkard; one must believe that he was driven into his excesses by some unknown disease of his constitution (see POLYDIPSIA). He was generous in his disposition; and he was a lover of truth, willing to sacrifice self-interest for its sake. P.'s memory was as amazing as his thirst. The anecdotes told by his biographers almost surpass belief yet are thoroughly authenticated. His critical acumen has never been matched in England. His tracts, reviews, letters, etc., were collected and edited, with a biographical notice, by Kidd, 6 vols. See 'Porsoniana' in Rogers's *Table-Talk*, and the Rev. J. Selby Watson's *Life of Richard Porson, M.A.* (1861).

PORT, n. *pōrt* [F. *porte;* It. *porta*, a door, a gate; *porto*, a harbor—from L. *porta*, a gate]: a gate; an entrance; a harbor; a safe station for ships (see PORT OF ENTRY; below). PORT'AL, n. *-ăl*, a small door or gate; any passage: on a vessel, an aperture below deck in the sides or stern, for admitting light and air (see PORTHOLE): the smaller gate where there are two; the arch over a door or gate; recess to a large doorway, such as the entrance to a church (see PORCH): ADJ. in *anat.*, relating to the *porta* or gateway of the liver. PORT'ING, imp. PORT'ED, pp.: ADJ. having gates. PORT'ER, n. *-ĕr*, a door or gate keeper; a waiter in a hall. PORT'RESS, n. *-rĕs*, a woman who attends a gate. PORT ADMIRAL, an officer in charge of a naval port, and of the vessels of war resorting thither. PORT CHARGES or DUES, certain sums paid for harbor or wharfage accommodation. PORT-LID, hanging-door that shuts the port or Porthole (q.v.). PORT OF ENTRY, a harbor where a custom-house is established for the lawful entry of excisable merchandise. PORT-TOWN, a town having a port, or situated near one. PORT-WARDEN, the officer in charge of a port; a harbor master. STEAM-PORT and EXHAUST-PORT, in a *steam-engine*, the openings for the constant or alternate entrance or exit of the steam, the former for the entrance, the latter for the exit.—SYN. of 'port, n.': haven; harbor; gate; entrance; gateway; opening; passage; inlet; cove; recess; embrasure.

PORT, v. *pōrt* [F. *porter*, to carry—from L. *portārĕ*, to carry, to bear: It. *portare*]: to carry a rifle or firearm in a slanting direction upward across the body in front, the lock to the front, the barrel crossing opposite the front of the left shoulder—as in the military command 'to *port* arms': among *seamen*, to turn or put to the left side of a ship, as '*port* the helm'—that is, 'put the helm over to the larboard side of the ship': N. the left side of a ship, looking forward, as 'the ship heels to *port*'—that is, inclines to the left or larboard side—the term *Larboard* (q.v.) was formerly used: the manner in which a person bears himself; carriage; demeanor; air. PORT'ING, imp. PORT'ED, pp.: ADJ. carried in front slanting upward and across PORT'ABLE, *a. -ăbl* [It. *portabile;* F. *portable*]: that may be easily

carried, as by hand; not bulky or heavy; easily transported. PORT'ABIL'ITY, n. *-bĭl'ĭ-tĭ*, the state of being portable; fitness to be carried. PORT'ABLENESS, n. *-bl-nĕs*, the quality of being portable. PORT'AGE, n. *-āj*, the act of carrying; the price of carriage; in *Amer.*, a break in a chain of water communication, over which merchandise, stores, and boats have to be carried on men's backs, or otherwise. PORT-CRAYON, *pōrt-krā'ŏn*, a metal tube split at each end for holding crayons or chalk-pencils. PORT'ER, n. *-ẽr*, one who carries burdens for hire; one who does the heavy work of a ship: a dark-colored malt liquor, at first made for and drunk by *porters* (see below). PORT'ERAGE, n. *-āj*, the money paid for the carriage of parcels or luggage by porters. PORT'LY, a. *-lĭ*, stately; having a dignified port or mien; bulky; corpulent. PORT'LINESS, n. *-lĭ-nĕs*, dignity of personal appearance depending upon large size of body and dignified manners; bulkiness; corpulence.—SYN. of 'port, n.': air; mien; carriage; bearing; behavior; deportment; demeanor; conduct.

PORT, n. *pōrt* [from *Oporto*, in Portugal]: a dark purple wine from Portugal. See PORT WINE; WINE.

POR'TA, BAC'CIO DEL'LA. See BACCIO DELLA PORTA.

PORT AD'ELAIDE (S. Australia). See ADELAIDE.

PORTADOWN, *pōrt-a-down'* (Ir. *Port-na-Doon*, Port of the Fort): market and manufacturing town of county Armagh, Ulster, Ireland; on the Bann, 11 m. n.e. of Armagh by railway. It was formerly the seat of the M'Canns, a clan tributary to the O'Neil, and formed part of the territory 'settled' by James I., and afterward by Charles I. It has a trade in corn, flax, and other agricultural produce; and is the seat of extensive manufacture of linen yarns and linen. Communicating by canal with the seat at Newry, and by railway with Belfast, it has also considerable import trade. Portadown is connected by the Ulster railway with Armagh, Dungannon, and with the several n.w. counties. Pop. about 10,000.

PORTAGE, *pōrt'aj:* city, county-seat of Columbia co., Wis., at the head of navigation on the Wisconsin river, and on the govt. ship canal connecting the Wisconsin and Fox rivers. It is at the junction of three divisions of the Chicago, Milwaukee & St. Paul railroad, and is the terminus of the s. division of the Wisconsin Central railroad, 32 m. n. of Madison, 85 m. n.w. of Milwaukee. It was settled in 1835, incorporated in 1837, and in 1854 was chartered as a city. It is in a productive agricultural region, and is the commercial and industrial center for quite a large portion of Columbia county. The chief manufactures are flour, brick, hosiery, knit-goods, and farm implements. The educational institutions are a high school, public and parish elementary schools, and a public library. In the vicinity are the ruins of Fort Winnebago (1828). The government is vested in a

mayor, who holds office two years, and a council. The city owns the waterworks. Pop. (1910) 5,440.

PORTAGE EPOCH, in Geology: lowest group in the Chemung period, Devonian age; named from Portage, N. Y., where 1,000 ft. of this group of rocks are seen in the upper gorge of the Genesee river. The rocks consist of shales and laminated sandstones; they are well exhibited at Ithaca, N. Y., and 1,400 ft. of them near Lake Erie, but have not been identified in e. N. Y., nor at the west, where the older black Genesee shales are followed by the sub-carboniferous. The fossils are sea-weeds, land-plants, shells, rarely a trilobite; in Delaware co., some fish-teeth.

PORTAGE LA PRAIRIE: Canada, a town in Manitoba, on the main lines of the Canadian P. and Canadian N. railways, 56 miles west of Winnipeg and 15 miles south of Lake Manitoba. It is an important railway center and the receiving and distributing point for the fertile 'Portage Plains,' one of the finest wheat-growing sections in the world. It has railway machine shops, a large flouring mill, grain elevators, a paper mill; churches, schools, banks, warehouses, and daily, semi-weekly, and weekly newspapers; and is the seat of an Indian Industrial School, and the Provincial Home for Incurables. Pop. 5,000.

PORTALIS, *por-tâ-lēss'*, JEAN ETIENNE MARIE: jurist: 1745, Apr. 1—1807, Aug. 23; b. France. He was educated at Toulon, Marseilles, and the Univ. of Aix, and soon became a prominent advocate and a leader in public affairs. In 1770 he drafted the decree by which Protestants were allowed to marry, was one of the administrators of Provence 1778-81, opposed the May edicts 1788, and was defeated for the states-general 1789. He declined the position of commissioner for dividing Provence into departments, was imprisoned after the formation of the republic, but on the overthrow of Robespierre was released and practiced law at Paris, led the opposition to the directory 1795, was afterward proscribed and found refuge in Switzerland. Bonaparte made him one of the four commissioners to form the *Code Civil*, of which he wrote many of the most important articles. He was a member of the Acad., became minister of public worship 1804, and the following year received the grand cross of the Legion of Honor. He died at Paris.

PORTAMENTO, n. *pōrt'ă-mĕn'tō* [It.—from L. *portārĕ*, to carry]: musical term used for the sustaining of the voice, and passing from one note to another.

PORT ARTHUR: Canada, city in Thunder Bay District, Province of Ontario; on Lake Superior; the lake terminus of the Canadian Northern, also on the Canadian P., and the Grand T. P. railroads; about 200 miles northeast of Duluth, Minn., and about 500 miles from Manitoba. It is the principal commercial point on the north-

west shore of Lake Superior. It is in a lumbering region and valuable mines of gold, silver and iron are adjacent. Large shipments of merchandise, coal, wheat, etc., are made to eastern ports. Iron is smelted here. The city is the iron center of the north shore and district, and there are also foundries, blast furnaces, brick yards and other manufactories. There are four banks capitalized at $30,000,000. Port Arthur has several churches, a high school, public schools, and a Separate school. The city was first settled in 1870, became a borough in 1884, and a city in 1907. The government is vested in a mayor and council of 10 members. The city is the county-seat for judicial purposes. Pop. (1907) 15,000.

PORT ARTHUR, or LU-SHUN-KOU: Manchuria, a strongly fortified seaport town at the southern extremity of the Liao-tung peninsula, dominating the Lao-tie-shan channel entrance to the Gulf of Pe-chi-li from the Yellow Sea and Korea Bay. Prior to its capture by the Japanese in the war of 1894 it was a Chinese fortress and naval arsenal. Its occupation by the Japanese was prevented by the Russian, German, and French coalition, but on March 27, 1898, the Chinese government leased it to Russia with adjacent territory for 25 years. Under the Russians it became the terminus of a railway line connecting with the Trans-Siberian railway, the Chinese railway systems, and with modern Dalny, the important commercial seaport city, 14 miles to the northeast. It was fortified, its harbor and dock accommodations extended, and it was considered one of the strongest fortresses and naval stations in Chinese waters. At the outbreak of the Russo-Japanese war in 1904 it was the scene of a series of disasters inflicted on the Russian navy, not only by the torpedo boats of the enemy, but also by their own submarine mines and forts. It was surrendered to the Japanese 1905, Jan. 3. See CHINA; DALNY; JAPAN; MANCHURIA.

PORT ARTHUR SHIP CANAL: Texas, an artificial waterway, named after the town of Port Arthur, which is situated on Sabine lake, a body of water three miles long and ten miles wide, which marks the boundary of Texas and Louisiana. Seven and one-half miles from Port Arthur Sabine lake narrows into a long channel called Sabine pass. This channel is from 26 to 40 feet deep and extends for seven miles to the south, terminating in the Gulf of Mexico. At the outer end of the pass is a bar which has been pierced by a channel formed by extending for a mile or more from shore two jetties of piled stone, built by the United States government, and costing $1,050,000. The jetties narrow the entrance to the pass from the gulf, and the wash of the imprisoned waters to and fro, with the ebb and flow of the tide, has scoured a channel over the bar of 16 to 25 feet deep. The opening of this canal signalized the creation of a new seaport on the gulf for the largest ocean vessels, the

connection of a land-locked fresh-water harbor with the terminus of an 800-mile railway system, and the reduction of 500 miles of the distance over which the export food products of the southwest states have been hauled by east and west lines. The canal was formally opened 1899, Mar. 25, in presence of about 5,000 people, with appropriate ceremonies.

PORT-AU-PRINCE, *pōrt-o-prĭnss'*, F. *pōr-tō-prăngss'*, or PORT-REPUB'LICAN: city, capital of Hayti (q.v.), on the w. coast, at the head of the Bay of Hayti. It has a fine appearance from the sea, but the interior is filthy in the extreme. The houses are chiefly of wood. The most notable buildings are the palace and the senate-house; other public edifices are the churches, a lyceum, college, custom-house, mint, and hospital. Port-au-Prince carries on a trade in mahogany, logwood, honey, coffee, cocoa, and rags. The city was founded in 1745 and has frequently suffered from earthquakes, in 1770 being totally destroyed; the city has also been ravaged by fires, notably in 1791, 1843, and 1867. Port-au-Prince, being the capital city of an exceedingly restless country, has witnessed the succession and overthrow of many of the Haytian rulers, and in its streets have occurred many bloody combats between adherents of the factions warring for control. On Sept. 28, 1888, a riot occurred in the city and General Telemaque, the aspirant for the presidency, was killed. In 1902, when the provisional government was in power, and before Nord Alexis had become president, the city was the scene of conflict between the government forces and those under General Firmin. Again in the early part of 1908 and throughout the entire year the city was in a state of panic because of a revolution undertaken to overthrow Nord Alexis. This was finally accomplished late in November, and after his army had deserted him and several attempts on his life had been made, Alexis was forced to flee to a foreign warship in the harbor. The city was then pillaged by the revolutionary soldiers, though for only a day or two, as the new government quickly prohibited acts of vandalism on the part of its adherents. General Simon was later elected president of the country. See HAYTI; SAN DOMINGO; DOMINICAN REPUBLIC.

PORT BLAIR: the principal port of the Andaman Islands on South Andaman.

PORT BRET'ON: a name given to the southeast part of New Mecklenburg (formerly New Ireland), in the Bismarck Archipelago off Kaiser Wilhelm Land, New Guinea, the scene in 1879 of a disastrous colonizing experiment by a company of French Legitimists. In 1883, the Marquis Du Rays, who floated the company, and his associates were condemned to various terms of imprisonment for fraud and raising money by false pretenses.

PORT CHES'TER: New York, village, Westchester county; on Long Island Sound, and on the New York, New Haven & Hartford railroad; 26 miles northeast of New York city. It was settled in the middle of the 18th century, and was at first called Saw Pit; the name was changed in 1837, and the village incorporated in 1868. It contains foundries, screw and bolt factories, carriage works, shirt factories and a woolen mill. It is also a summer resort. It contains a public hospital, also a public library, and high school which has its own school library. The village is governed by a president and a board of trustees, all holding office for two years. Pop. (1900) 7,440; (1910) 12,809.

PORT CLIN'TON: Ohio, village, county-seat of Ottawa county; on Lake Erie at the mouth of the Portage river, and on the Lake Shore & Michigan Southern railroad; 64 miles west of Cleveland. It has a good harbor, and carries on a considerable lake trade, being the commercial center of a region where the chief industry is grape and peach culture; lime and building stone are also obtained in the vicinity, and gypsum is mined. Fruit baskets are manufactured, and the fisheries are also of commercial importance. The village contains a public high school. Pop. 2,550.

PORTCULLIS, n. *pōrt-kŭl'lĭs* [F. *porte-coulisse,* a sliding-gate—from *porte,* a gate; *couler,* to slide: L. *porta,* a door; *colārĕ,* to filter, run]: frame or grating of wood strengthened with iron in the form of a harrow, suspended over the doorway of a fortified place, and sliding in vertical grooves in the jambs of the entrance gate, for defense against assault. The vertical bars were pointed with iron below, and struck on the ground when the grating was dropped, so as to injure whatever it fell upon. In heraldry, the portcullis is represented with rings at its uppermost angles, from which chains depend on either side. Portcullis is the title of a pursuivant in the English College of Arms, whose office was instituted by Henry VII. PORTCULLIS, v. to arm with a portcullis; to bar or obstruct. PORTCUL'LISING, imp. PORTCUL'LISED, pp. *-lĭst:* ADJ. having a portcullis.

PORT DARWIN, *pōrt dâr'wĭn:* one of the finest harbors in Australia; on the n. coast of the island continent. It is in the Northern Territory politically connected with S. Australia; though it is about 2,000 m. n.n.w. from Adelaide, with which there is regular connection by mail steamers. It is named after Charles Darwin, who, with Dr. King, made a survey of the n. coast (1818-22). The entrance is two m. wide, with a depth of water of 15 fathoms; vessels of any tonnage can enter with safety. The overland telegraph cable enters the seat at Palmerston, connecting with Java, Singapore, and India. A survey for a railway from Port Darwin to Pine Creek goldfields was made, connecting the Northern Territory with

the main railway system of the province, and this was opened in 1891.

PORT D'URBAN, *pōrt dėr-băn'*, or PORT NATAL, *na-tâl':* only seaport of the colony of Natal (q.v.). See DURBAN.

PORTE, n. *pōrt,* or SUBLIME PORTE [F. *porte;* L. *porta,* a gate: name formerly (and still occasionally) given to the Ottoman court, being a perverted F. translation of *Bab-i-Ali—lit.,* the High Gate—the chief office of the government: L. *sublīmis porta,* the lofty gate]: court and government of the Turkish empire. The origin of this name is to be referred to the ancient oriental custom of making the gates of cities and of king's palaces places of assembly in connection with the affairs of government and of the administration of justice. In the Byzantine empire this custom was adopted, and the term was transferred from the high gate of the imperial palace to the government whose authority was there exercised. The Turks found the term in common use among the Byzantines previous to their establishment at Constantinople, and adopted it on the organization of their empire. The use, among European nations, of the French term *Sublime Porte* ('Lofty Gate') is accounted for by the fact that French is the language of European diplomacy.

PORTE-FEUILLE, n. *pōrt-fėl'yė* [F.—from *porter,* to carry; *feuille,* a leaf]: a portfolio; a pocket-book.

PORTELECTRIC SYSTEM OF TRANSPORTATION: modification of the electric railway adapted for rapid transport of mail and light packages. A steel car, long and narrow, is carried on a track, preferably an elevated one. The track is surrounded at intervals, smaller than the car-length, with coils of insulated wire, representing electromagnet coils. It is evident that if a current is passed through one of the coils a car near it will be drawn into it by electromagnetic action. This is utilized to drive the car. The motion of the car makes and breaks circuits, so that the current is caused to pass through the coil in front of it, and before its center has reached the center of the coil, it breaks the circuit and makes it for the coil next in advance. In this way it is continually drawn along without any motor, and with no moving parts except its own wheels and the subsidiary make and break switches. The car in its motion generates a certain amount of counter-electromotive force which acts as a regulator in preserving a constant speed. The coils near the starting points are made of extra power to start the car into motion. As a brake, the current is maintained in the helices near the stopping point after the car has passed their centers, thus drawing it back and bringing it quickly to rest.

PORT ELIZABETH, *pōrt ē-lĭz'a-bĕth:* important seaport of s. Africa, commercial cap. of the E. Province of

the British colony of the Cape of Good Hope; on the w. shore of Algoa Bay (q.v.). Its public buildings are solid and substantial: the principal are the town-house, public hospital, custom-house, Presb. and other churches, and the Rom. Cath. cathedral. The Grey Institute Schools comprise a high school or college, and three elementary or district training-schools. The town was founded 1820. Notwithstanding its poor harbor, and lack of good drinking-water, Port Elizabeth early made more rapid advancement than any other town in the colony; but these drawbacks were removed by the great improvements in the harbor 1881, and by the construction of a 28 m. long aqueduct 1878. Port Elizabeth owes its commercial importance in great part to its being the emporium of the great wool trade of the colony; besides it has a rapidly-increasing home and foreign trade. The transactions of its banks are extensive. The shore is open to the swell of the Indian Ocean, which often rolls in upon the beach with such violence that, until recently, cargoes could be brought to land only by the use of surf-boats, managed with great skill and daring by the Kafir boatmen. But this mode is now largely discarded by reason of the improvements referred to above, and ships unload at several jetties. A breakwater has been constructed, and there are three lights for direction of vessels. Pop. about 25,000.

PORTEMONNAIE, n. *pōrt-mŏn'nā* [F.—from *porter*, to carry; *monnaie*, money]: a small pocket-book for carrying money; a purse.

PORTEND, v. *pŏr-tĕnd'* [L. *porten'dĕrĕ*, to indicate future events, to predict—from *pro*, forward; *tendĕrĕ*, to stretch: It. *portendere*]: to indicate as something future by signs or tokens, in an ominous sense; to forebode; to presage. PORTEND'ING, imp. PORTEND'ED, pp. previously indicated by signs. PORTENT, n. *pŏr'tĕnt* [L. *porten'tum*, an omen, a portent]: an ill omen; a sign of coming calamity. PORTENTOUS, a. *pŏr-tĕn'tŭs*, ominous; foreshadowing ill; wonderful, in an ill sense; prodigious; excessive. PORTEN'TOUSLY, ad. *-lĭ*.—SYN. of 'portend': to foretoken; betoken; presage; foreshow; forebode; augur; threaten.

PORTER: kind of malt liquor which came into use in London 1722. According to Leigh, 'the malt liquors previously in use were ale, beer, and twopenny, and it was customary to call for a pint or tankard of half-and-half —i.e., half of ale and half of beer, half of ale and half of twopenny, or half of beer and half of twopenny. In the course of time it also became the practice to ask for a pint of tankard of three-thirds (or, as it became corrupted, *three threads*), meaning a third each of ale, beer, and twopenny; and thus the publican was obliged to go to three casks for a single pint of liquor.' To avoid this trouble and waste, a brewer, Harwood, made a liquor

partaking of the united flavors of ale, beer, and two-penny; this he called entire, or entire butt beer, 'meaning that it was drawn entirely from one cask or butt; and being a hearty, nourishing liquor, it was very suitable for porters and other working people. Hence it obtained the name of Porter, and was first retailed at the Blue Last, Curtain Road, Shoreditch.' The chief characteristics of porter are its dark-brown color, peculiar bitter flavor, and agreeable freshness in drinking. Formerly it was generally brewed with malt roasted until slightly brown; now, however, under the improved system of brewing, pale malt is used, with the addition of some highly roasted, for color only. Enormous quantities are brewed by the London brewers. A kind much stronger than ordinary porter is also extensively brewed in London, Dublin, and elsewhere, under the name of *stout*. The name porter is now seldom used, stout being the general designation.

POR'TER, *pōr'tėr*, ALEXANDER: American jurist: b. Armagh, County Tyrone, Ireland, 1786; d. Attakapas, La., 1844, Jan. 3. He came to the United States in 1801, settled in Nashville, Tenn., studied law and was admitted to the bar in 1807. He established a law practice in Saint Martinsville, La., in 1810; was a member of the convention which framed the state constitution in 1811; in 1821 was appointed a judge of the supreme court of Louisiana. During his 12 years' occupation of that office he established a fixed system of jurisprudence to supersede the chaotic mixture of Spanish, French, and civil law in use. Elected United States senator in 1833, he voted to censure President Jackson for removing the deposits from the United States bank, opposed the abolition of slavery in the District of Columbia and the bill to compel specie payment for public lands, advocated the division of surplus revenue among the states and also the recognition of Texas' independence. He was re-elected to the senate in 1843.

PORTER, ANDREW: revolutionary soldier: 1743, Sep. 24—1813, Nov. 16; b. Worcester, Penn. He established an English and mathematical school in Philadelphia 1767, continuing it to 1776, when he was appointed officer of artillery, after brief service as captain of marines. By successive promotions he became colonel of a Pennsylvania regiment, and was in the most noted battles of New Jersey and Pennsylvania; also in the campaign of Gen. Sullivan against the Six Nations of Indians, 1779, when he rendered important service in enabling boats to pass between the valleys of the Mohawk and Susquehanna rivers. At the end of the war, declining a professorship in the University of Pennsylvania, he engaged for a time in surveying the boundary of the state; became brigadier-general of militia 1801, afterward major-general; surveyor-general 1809; and, on account of infirmities,

declined the secretaryship of war under Pres. Monroe. He died at Harrisburg, Penn.

PORTER, Benjamin Curtis: American portrait painter: b. Melrose, Mass., 1843, Aug. 27; d. New York city, 1908, Apr. 2. He studied art in Paris and Vienna and during the first of his career devoted himself to figure painting, but afterward made portraits his specialty. In 1880 he became a member of the National Academy. His work showed harmonious coloring, and his portraiture was accurate and striking. Among his works are. *Henry V. and the Princess Kate* (1868); *Cupid with the Butterflies* (1874); *Portrait of Boy with Dog* (1884); etc.

POR'TER, David: commodore: 1780, Feb. 1—1843, Mar. 3; b. Boston. His father, grandfather, and other relatives distinguished themselves in naval service; also his son, Adm. David D. Porter. In his youth he was twice impressed into the British service, while on merchant voyages, but made his escape. As midshipman on the frigate *Constellation,* he had part in the battle with the French *Insurgente,* 1799, and the next year, as lieutenant, he repelled an attack on his schooner in the W. Indies, afterward capturing a French vessel of 14 guns. In 1803 his like success off Tripoli ended in his capture and imprisonment. Released when peace was made, he rose to the captaincy of the frigate *Essex,* 32 guns, seized a British transport, and took the first British ship of war in the war of 1812. The next year his exploits were in the Pacific, where he destroyed the British whale ships, the damage computed at 2½ million dollars. Arming one of the vessels taken and naming it *Essex, Jr.,* he subdued and claimed one of the Marquesas Islands for the United States; returned to Valparaiso 1814, where he fought a hard battle with the British ship *Phœbe,* 53 guns, whose long range proved the destruction of the *Essex.* On parole to the British captain, he reached Sandy Hook in the *Essex, Jr.,* and was seized by one of the enemy's ships, but escaped, and was voted thanks by congress In subsequent operations against pirates in the W. Indies, he was court-martialed for his acts at Porto Rico. He commanded the Mexican navy 1826-29; and afterward was U. S. consul-general to the Barbary States; and in diplomatic service at Constantinople, where he died. He published *Journal of Cruise in the Pacific Ocean* (1815), and *Constantinople and Its Environs* (1835).

POR'TER, David Dixon: admiral U. S. N.: 1814, June 8—1891, Feb. 13; b. Philadelphia; son of David Porter (q.v.), distinguished naval officer. In 1826 his father was made commander-in-chief of the Mexican navy in the war against Spain, and the boy went with him as midshipman. He was on the *Guerrero,* which was captured after a hot engagement. In 1829 he became a midshipman in the U. S. navy, and 1845 was attached to the

Washington Observatory. In 1849 he commanded in the mail service to California. On the date of the breaking out of the civil war, he had reached the grade of commander, and was sent by the government to the relief of Fort Pickens, characteristically evading the revocation of the order. He prepared a fleet of mortar-boats to aid in the reduction of New Orleans. After the fall of that city, Porter was placed in command of all the naval forces on the Mississippi, with the rank of rear-admiral. His services in these waters were very valuable, and proved his tactical skill, readiness of utility of resources, and boldness of initiative. He commanded the naval forces which captured Fort Fisher 1865. In 1866 he was made vice-admiral, and for two years was supt. of the Naval Acad. He succeeded Farragut as the admiral of the navy on the death of that hero 1870.

During the remainder of his life his duties were chiefly consultative. In his later years he published a life of his father (1875), *Anecdotes of the Civil War* (1885), and a *History of the Navy in the War of the Rebellion* (1887).

He prided himself, however, more on his novels, of which he published two—*Allan a Dare* and *Robert le Diable* (1885), and *Henry Marline* (1886), than on his more serious writings, more even, perhaps, than on his professional renown. Admiral Porter died, and was buried at Washington, D. C. His death called forth expressions of respect for his personal bravery and splendid achievements from the whole people.

POR'TER, Ebenezer, D.D.: Congregational minister, professor of sacred rhetoric: 1772, Oct. 5—1834; b. Cornwall, Conn.; son of Thomas Porter, jurist and revolutionary soldier. He was graduated at Dartmouth Coll. 1792, and after a private course in theol. was pastor at Washington, Conn., 1796-1812, then becoming professor of sacred rhetoric at Andover Theol. Seminary, over which institution he presided 1827-34. He died at Andover. He published *The Young Preacher's Manual* (1819); *Analysis of Vocal Inflections* (1824); *Analysis of the Principles of Rhetorical Delivery* (1827); *Syllabus of Lectures* (1829); *Lectures on Revivals of Religion* (1832); *Cultivation of Spiritual Habits, and Progress in Study* (1833); *Lectures on Homiletics, Preaching, and Public Prayer* (1834). His *Lectures on Eloquence and Style* were published after his death by the Rev. Lyman Matthews, who also wrote a memoir of his life.

POR'TER, Fitz John: soldier: b. Portsmouth, N. H., 1822, June 13; d. Morristown, N. J., 1901, May 21; son of Commander John Porter, U. S. N. He graduated at the U. S. Milit. Acad., and was assigned to the 4th U. S. artillery 1845; served through the Mexican war, was wounded at the capture of Mexico City, and received brevets of captain for services at Molino del Rey and major for Chapultepec; and was assistant instructor of artillery in the U. S. Military Academy 1849, adjutant

1853-4, and instructor of artillery and cavalry 1854-5. In 1856 he was appointed assistant adjutant-general U. S. A. He was appointed colonel 15th U. S. Infantry 1861, May 14, and brigadier-general of volunteers May 17, and served under Gens. Patterson and Banks till August, when he was assigned to duty in connection with the protection of Washington. In the Peninsular campaign in Virginia he successfully directed the siege of Yorktown Apr. 5—May 4, and was rewarded with command of the 5th corps, right wing of the Army of the Potomac. He fought the battles of Mechanicsville June 26, and Gaines's Mill June 27; was brevetted brigadier-general U. S. A. for the latter; commanded the left flank which bore the brunt of the Confederate assaults at Malvern Hill July 1, and July 4 was promoted major-general of volunteers, and temporarily assigned to Gen. Pope's army of Virginia. In the second battle of Bull Run he was ordered to attack Gen. Longstreet Aug. 29, but did not do so, and on the following day was actively engaged, and saved the army from total rout. He was deprived of his command for disobedience of orders, was restored at Gen. McClellan's request, and rendered good service at Antietam. 1862, Nov. 27, he was tried by court-martial for disobeying orders, and 1863, Jan. 21, was cashiered. His defense was that he did not receive the 4:30 o'clock order to attack till 6:30, when it was too late, and that, unknown to Gen. Pope, Gen. Longstreet had an overwhelming force before him, which it would have been folly to attack. After persistent efforts by Porter to secure a reversal of the decision of the court-martial, congress authorized the appointment of an advisory board to rehear the case 1878. The board exonerated Porter, and recommended his restoration. President Arthur remitted the disqualifying portion of the sentence 1882; several bills for Porter's relief failed to become law; 1886, July 1, a bill for his restoration was signed by President Cleveland, and at his own request he was placed on the retired list as colonel Aug. 7, following. After his dismissal from the army he was offered and declined the command of the Egyptian army 1869; superintended the construction of the N. J. asylum for the insane at Morris Plains; and was commissioner of public works in New York 1875-6; assistant receiver of the Central Railroad of New Jersey 1877-82; police commissioner, New York, 1884-8; fire commissioner 1888-9; and cashier of the postoffice 1893-7. An offer, received in 1869, from the khedive, to command the Egyptian forces with major-general's rank was declined by Porter. Among the best statements of the case for and against Porter may be mentioned: Lord, *A Summary of the Case* (1883), and Cox, *The 2d Battle of Bull Run as Connected with the Fitz-John Porter Case* (1882).

PORTER, HORACE, LL.D: American diplomat: b. Huntingdon, Penn., 1837, Apr. 15; son of Gov. David R.

Porter. He graduated from West Point 1860, and was for a few months instructor there. In the civil war he served as ordnance officer at various points and reached the rank of colonel while on the staff of Gen. Grant. In 1865 he was brevetted brigadier-general for his services throughout the war. In 1867 he was assistant to Gen. Grant while secretary of war and became his private secretary when he was elected president. In 1873 he resigned from the army and entered upon a successful business career. From 1897-1905 he was ambassador to France, and in 1905 located the burial-place of John Paul Jones, later sending the body to the U. S. for burial at Annapolis. He wrote *West Point Life* (1866) and *Campaigning with Grant* (1897).

PORTER, James Davis, A.M., LL.D.: American politician: b Paris, Tenn., 1828, Dec. 7. He was graduated from the University of Nashville in 1846; admitted to the bar in 1850; and sat in the Tennessee legislature 1859-61. He served in the Confederate army during the civil war, and was adjutant-general on the staff of Major-General Cheatham. In 1870-4 he served as judge of the 12th judicial circuit and in 1874-8 was governor of Tennessee. He was United States assistant secretary of state in 1885-9; and minister to Chile in 1893-7. He has been president of the Peabody College for Teachers and chancellor of Nashville University since 1901. He wrote: *The Confederate Military History of Tennessee.*

POR'TER, Jane: novelist: 1776-1850, May 24; b. Durham, England; daughter of a surgeon in the army, and sister of Robert Ker Porter, artist of note. Her father died when she was young, and her mother removed to Edinburgh, where Jane was educated; and thence 1796 to London. In 1803 she published her first novel, *Thaddeus of Warsaw,* which immediately captivated the public, was translated into several languages, and is still read with interest, as is also *The Scottish Chiefs* (1809). Other works of hers were: *The Pastor's Fireside* (1815); *Duke Christian of Luneburg* (1824); *Tales Round a Winter's Hearth* with A M. Porter (1824); *The Field of Forty Footsteps* (1828); and *Sir Edward Seaward's Narrative of his Shipwreck and Consequent Discovery of Certain Islands in the Caribbean Sea* (1831). The *Scottish Chiefs* was even more successful than *Thaddeus of Warsaw,* despite the fact that it contains much high flown sentiment and stilted characterization.

PORTER, Jermain Gildersleeve, A.M., PH.D.: American astronomer: b Buffalo, N. Y., 1852, Jan. 8. He was graduated from Hamilton College, Clinton, N. Y., in 1873 and studied at the University of Berlin. He was appointed to the United States coast and geodetic survey in 1878 and since 1884 has been director of the Cincinnati Observatory and professor of astronomy at the University of Cincinnati. He has published: *Zone Cata-*

logue of 4050 Stars (1887); *Our Celestial Home* (1888); *Catalogue of 2030 Stars* (1898); *The Stars in Song and Legend* (1901); *Catalogue of 4280 Stars* (1905); etc.

POR'TER, Moses: 1755-1822, Apr. 14; b. Danvers, Mass. He served throughout the revolution, entering the army as lieutenant of artillery 1775, May 19; and after the close of the war was retained as an officer of the standing military force. He was with Gen. Wayne in the expedition against the Indians in the northwest 1794, and served at numerous points in the war of 1812. By various promotions he reached the rank of colonel, and 1813 he was brevetted brigadier-general. He died at Cambridge, Mass.

PORTER, Noah, d.d., ll.d.: American educator: b. Farmington, Conn., 1811, Dec. 14; d. New Haven, Conn., 1892, Mar. 4. Graduated from Yale in 1831, he was a tutor and student of theology there in 1833-5, was pastor of Congregational churches at New Milford, Conn., 1836-43, and Springfield, Mass., 1843-6. In 1846 he was made professor of moral philosophy and metaphysics at Yale, and from 1871 until his resignation in 1886 was president of that institution. His adminstration was a distinguished one. During it the curriculum was broadened by the introduction of new elective subjects, although Porter never favored the development of the elective system attempted at Harvard and supported the classics for the leading place in a scheme of liberal training. The material progress was also of note, large additions being made to the buildings and funds. Porter was also known as the editor of revised editions of Webster's *Unabridged Dictionary*. He ranked among the foremost American metaphysicians of his time. Among his writings are: *Historical Discourse on Farmington* (1841); *The Educational Systems of the Puritans and Jesuits Compared* (1851); *The Human Intellect* (1868; and many subsequent edd.); *Books and Reading* (1870); *American Colleges and the American Public* (1871); *Science of Nature vs. the Science of Man* (1871), a review of the philosophy of Spencer; *Evangeline: the Place, the Story, and the Poem* (1882); *Science and Sentiment* (1882); *The Elements of Moral Science* (1885); a *Life of Bishop Berkeley* (1885); and *Kant's Ethics: A Critical Exposition* (1886).

PORTER, Peter Buel: American soldier: b. Salisbury, Conn., 1773, Aug. 14; d. Niagara Falls, N. Y., 1844, Mar. 20. He was graduated at Yale College in 1791, studied at the Litchfield law school, and in 1795 began practice at Canandaigua, N. Y. In 1808 he was chosen a representative in congress, where as chairman of the committee on foreign relations he prepared and introduced the celebrated report of December, 1811, recommending war against Great Britain. As soon as hostilities had been declared he resigned his seat in con-

gress, was appointed quartermaster-general of New York, and took command of a body of Pennsylvania and New York volunteers and Indians of the Six Nations. Black Rock, where General Porter resided, having fallen into the hands of the British in June, 1813, and his own house, from which he had barely time to escape, being their headquarters, he rallied a force by which they were expelled, and their commander mortally wounded. In July, 1814, he joined Brown's invading army with a brigade of 3,500 volunteers and Indians and distinguished himself at Chippewa, and Lundy's Lane, and the siege of Fort Erie. Porter was one of the earliest projectors of the Erie Canal, and was named, with Morris and Clinton, on the first board of commissioners to explore a route for it. In 1816 he was appointed commissioner under the treaty of Ghent for determining the northwestern boundary. In May, 1828, he was appointed secretary of war by President Adams.

PORTER, Sir Robert Ker: English artist, brother of Jane and Anna Maria Porter: b. Durham, 1775; d. Saint Petersburg, Russia, 1842, May 4. He studied at the Royal Academy in London, and became famous for his battle pieces. In 1804 he was appointed historical painter to the czar of Russia. In 1808 he served under Sir John Moore in Spain, and in 1811 returned to Russia, where he married the Princess Sherbatoff. He was knighted in 1817, and from then until 1820 was engaged in antiquarian studies in Asia. In 1826-41 he was British consul at Venezuela. Of his paintings the most notable were: *The Storming of Seringapatam* (1800, destroyed by fire); *The Siege of Acre; Agincourt; Peter the Great Planning the Port of Cronstadt and Saint Petersburg; Christ at the Last Supper Blessing the Cup;* etc. He wrote: *Travelling Sketches in Russia and Sweden* (1808); *Travels in Georgia, Persia, Armenia, and Ancient Babylonia* (1821-2); etc.

PORTER, Robert Percival: American journalist and statistician: b. Norfolk, England, 1852, Jan. 30. He came to this country in 1867, engaged in journalism, and was employed on the Chicago *Inter-Ocean* when it was established in 1872. He made the report on wealth, debt, taxation, and transportation in the United States for the tenth census, and in 1882 was a member of the tariff commission. He traveled in Europe, studying industrial conditions for several American newspapers, was one of the founders of the New York *Press*, and in 1889-93 superintended the eleventh United States census. He traveled in Japan to investigate industrial and commercial conditions there, and in 1898-9 was United States commissioner to Cuba and Porto Rico. In 1904 he joined the staff of the London *Times* as editor of the engineering supplement and in 1906 became its principal correspondent in North America. He has written *Local Government at Home and Abroad* (1879); *Breadwinners*

Abroad (1884); *Life of William McKinley* (1896); *Industrial Cuba* (1899); *Municipal Ownership and the Public Franchise* (1903); *Dangers of Municipal Ownership* (1907); etc.

PORTER, Rufus: American inventor, founder of the *Scientific American:* b. West Boxford, Mass., 1792, May 1; d. New Haven, Conn., 1884, Aug. 13. He had a common school education and early displayed inventive abilities, and while at Billerica, Mass., in 1825, invented a successful cord-making machine. Among later inventions of his were a steam engine, a portable horse-power, a corn sheller, churn, washing machine, signal telegraph, and a fire alarm. He became editor of the *New York Mechanic* in 1840, and soon made it a scientific newspaper, the first of its kind in the country. The next year the title was changed to the *American Mechanic,* and the office removed to Boston, but after a few issues Porter's attention was diverted to other things and the publication stopped. In 1845 he went to New York and began the issue of the *Scientific American* with a cash capital of $100, dating the first number 1845, Aug. 28, and on the title page styling it 'The Advocate of Industry and Enterprise, and Journal of Mechanical and Other Improvements.' The *Scientific American* of to-day is conducted substantially upon the plan originally marked out by its founder, but after publishing it six months he transferred the publication to its present proprietors. During the remainder of his life he continued his inventive experiments.

PORTER, William David: American naval officer, son of David Porter (q.v.): b. New Orleans, La., 1809, Mar. 10; d. New York, 1864, May 1. He entered the United States Navy as a midshipman in 1823, attained rank as lieutenant in 1833, served in the Gulf of Mexico in the Mexican war, and in 1855 was placed on the retired list. He originated the lighthouse system in use in the United States, and in 1859 re-entered the navy with the rank of commander. He built the ironclad Essex and commanded her in the Mississippi flotilla in 1861-2; participated in the capture of Forts Donelson and Henry, forced a passage by the Confederate batteries down the Mississippi to New Orleans, was engaged at Vicksburg and Baton Rouge (where he destroyed the Confederate ram Arkansas), Natchez, and Port Hudson, and received rank as commodore in 1862, July.

PORTERFIELD, *pōr'tėr-fēld,* Charles: soldier: 1750-1780, Oct.; b. on Santee river, S. C.; brother of Robert Porterfield. He joined a company of volunteers under Capt. Daniel Morgan, 1775, and with it marched to Cambridge, Mass.; then was in the expedition against Quebec, and was taken prisoner. After being exchanged, Porterfield took command of a company in Morgan's rifle corps and served in that command during the campaigns of

1777-8. As lieutenant-colonel of a Virginia regiment he marched to the relief of Charleston 1780. While serving in the advanced guard of Gen. Gates's army, he received a mortal wound in a skirmish with the advanced guard of the enemy.

PORTERFIELD, ROBERT: soldier: 1752, Feb. 22—1843, Feb. 13; b. Frederick county, Va.; brother of Charles Porterfield (q.v.). He became lieutenant in a company of volunteers 1776; served under Col. Daniel Morgan through the campaigns of 1777-79, and was in the battles of Brandywine, Germantown, and Monmouth. He participated in the siege of Charleston, S. C., and there was taken prisoner 1780, May. He was magistrate of Augusta county, Va., more than 50 years, and was sheriff twice.

PORTFOLIO, n. *pōrt-fō'lĭ-ō* [F. *porte-feuille*—from *porter*, to carry; *feuille*, a leaf—from L. *portārĕ*, to carry; *folĭŭm*, a leaf]: a portable case in which to keep loose papers; a collection of prints, designs, and the like; in certain foreign governments, the office and functions of a minister of state.

PORT GIBSON, BATTLE OF: after much unsuccessful effort to reach Vicksburg from the north, Gen. Grant, in 1863, determined to move his army by land down the west bank of the river some 70 miles and cross the Mississippi below Vicksburg, while transports for crossing should run past the Vicksburg batteries. Admiral Farragut had already run two of his vessels past the Confederate batteries at Port Hudson and Grand Gulf, and cleared the river of the enemy's boats below Vicksburg. On the night of Apr. 16 Admiral D. D. Porter ran the Vicksburg batteries with a fleet of six vessels and three transports carrying stores, one of the transports being lost. Six days later, five more transports, towing 12 barges, ran the batteries safely, a sixth being sunk, and half the barges disabled. Meanwhile Grant had marched McClernand's and McPherson's corps from Milliken's Bend for New Carthage, and upon arriving at that place and finding a limited number of transports the troops were marched to Hard Times, where a number of boats were collected from the different bayous in the vicinity, and Apr. 29, having 10,000 troops on barges and transports, Grant was opposite Grand Gulf, prepared to land and carry the place by storm the moment the batteries bearing on the river had been silenced by the navy. Admiral Porter, with seven ironclads, opened the attack at 8 a. m., and engaged at close quarters until 1:30 p. m.; but from the great elevation of the Confederate batteries, he found it impracticable to silence them with his guns, and therefore withdrew, when Grant immediately decided to land his men on the Louisiana shore and march them across the point to below Grand Gulf, the gunboats and transports to run the batteries. At dusk the gunboats

engaged the batteries, and all the transports ran by, the gunboats following. Grant had heard of a good landing on the east bank of the river, and at daybreak of the 30th transports and gunboats began the ferrying of the troops across to Bruinsburg, ten miles below Grand Gulf and 32 in a straight line below Vicksburg. At noon McClernand's corps, four divisions, 18,000 men, had been landed, and at 4 p. m. McClernand pushed out into the country, and at 1 a. m. of May 1 met the Confederates 12 miles from Bruinsburg and four from Port Gibson, and after a slight skirmish the advance division, under Gen. Carr, lay on its arms until daybreak. The Confederate force met was Gen. Green's brigade, which had marched from Grand Gulf on the afternoon of the 30th. During the night it was joined by Gen. Tracy's brigade from Vicksburg, and line was formed about three miles west of Port Gibson, across two roads converging on the town and uniting just outside of it. Green was across the southern road, and Tracy across the northern one, the roads running on two ridges, separated by a deep ravine, filled by a dense growth of cane and underbrush. At 5 a. m. May 1 the battle was opened by the advance of Osterhaus' division on the left, which was checked and repulsed by Tracy's brigade with much loss, and made no further progress until late in the afternoon. Carr's division, supported by Hovey's, advanced on the right and assaulted the ridge held by Green's brigade, and after a hard fight carried it, capturing two guns and over 300 prisoners, Green falling back toward Port Gibson. Gen. J. S. Bowen, commanding the Confederate forces at Grand Gulf, arrived on the field with Gen. Baldwin's brigade, about 9 a. m., and formed line in Green's rear, Carr and Hovey continued to press Green, who was soon withdrawn and sent to assist Tracy, leaving Baldwin to oppose them. Early in the afternoon Baldwin was attacked, and a severe contest ensued, lasting nearly two hours, during which Bowen, with two regiments of Col. F. M. Cockrell's brigade, which had arrived about noon, made a very determined effort to turn McClernand's right, but the attempt was defeated, and Cockrell's men joined Baldwin. Meanwhile Logan's division of McPherson's corps had come up and, part of it joining Osterhaus, both advanced on Tracy's and Green's brigades and slowly forced them back. McClernand's troops on the right again attacked Baldwin, and just at sunset the entire Confederate force, Baldwin covering the rear, fell back, through Port Gibson, and destroyed the bridge over the south fork of Bayou Pierre, two miles beyond Port Gibson. Grant entered the place next morning. The Union losses were 131 killed, 719 wounded and 25 missing. The Confederate forces lost five guns and reported 68 killed, 380 wounded, and 384 missing.

PORT-GLASGOW, *pōrt-glăs'gō:* parliamentary burgh and seaport of county Renfrew, Scotland; on the Clyde,

about 2 m. e. of Greenock; 20 m. n.w. of Glasgow. It was founded 1668 by the magistrates of Glasgow as a harbor for the ships that belonged to or traded with their city—the Clyde at Glasgow being then inconveniently shallow, and the plan of deepening the river not having yet been proposed. In 1695 the town and a small adjacent dist. were made into an independent parish; 1710, it was constituted the principal custom-house on the Clyde; 1775, it was incorporated as a municipality, and by the Reform Bill 1832, was raised to a parliamentary burgh. The principal buildings are the town-house, custom-house, and churches of various denominations. It has extensive manufactures of sail-ropes, chain-cables, foundries, building-yards, commodious quays, and an extensive wet-dock. The deeping of the Clyde, enabling large vessels to ascend to Glasgow, seriously injured its commercial prosperity. Pop. (1901) 16,840.

PORTH, n. *pōrth* [L. *portus*, a harbor]: in *Cornwall* and *Wales*, a cove or creek of the sea.

PORTHOLE, *pōrt'hōl;* usually shortened to PORT: embrasure or opening in the side of a ship, through which a gun is fired, a hawser passed out, or cargo passed in or out. They are known by various names, as cargo port, gun port, etc.

PORT HOPE: town, port of entry in Durham co., Canada, in the province of Ontario; on Lake Ontario, and on the Grand Trunk railroad; about 60 m. e. by n. of Toronto. There are steamer connections with the principal lake ports, and there is here a good harbor. The chief industries of the place are fishing (it has a large fishing fleet), and manufacturing of leather, machinery, steam engines, iron castings, buttons, woolen goods, and woodenware. There is a large trade in its own manufactures, grain, and lumber. Pop. (1901) 4,188.

PORT HUDSON, SIEGE OF: Port Hudson, a small village in Louisiana, on the e. bank of the Mississippi, 135 m. above New Orleans, was occupied by the Confederates, under Gen. Breckenridge, after their defeat at Baton Rouge, 1862, Aug. 5. The place was in a sharp bend of the river, on bold bluffs rising 75 to 90 ft. above it, which for 3 m. along the river were strongly fortified and armed with heavy guns. In November, 1862, Gen. Banks was ordered to relieve Butler, in command at New Orleans, under instructions from Halleck requiring Banks to clear the Mississippi river. Gen. McClernand had been given authority to organize an expedition on the upper Mississippi to reduce Vicksburg, and the intention was that Banks should ascend the river from New Orleans, join forces with McClernand at Vicksburg, and assume command for operations against that place. Banks arrived at New Orleans with about 20,000 men December 14, relieved Butler, and was surprised to learn that the Confederates held Port Hudson, with 21

heavy guns on the bluffs and a garrison reported as numbering from 12,000 to 16,000 men. Nothing was heard from McClernand or Grant. On the 18th Gen. Grover, with a division of 18,000 men and some artillery, was sent to occupy Baton Rouge, 25 m. s. of Port Hudson, which was accomplished without opposition and was the first step in the reduction of Port Hudson.

After providing for the security of New Orleans, Banks organized his available forces into a corps of four divisions, under command of Gens. Augur, Thomas W. Sherman, Emory and Grover. Exaggerated reports of the strength of the Confederates at Port Hudson forbade a direct attack upon it, and Banks endeavored to turn it on the w. and reach Vicksburg by means of the Atchafalaya, the mouth of Red river, and the various bayous connecting the Atchafalaya with the Mississippi, but was unsuccessful, and was turning his attention to a movement from Berwick Bay by the Atchafalaya, when news came that two of Col. Ellet's rams, after running the batteries of Vicksburg, had been captured. Admiral Farragut, who was coöperating with Banks, now proposed to run his fleet past the batteries of Port Hudson, recapture or destroy the rams, and thus control the river as far up as Vicksburg, and cut off supplies from the Red river country. Banks promptly assented and moved from Baton Rouge, with 17,000 men, to the rear of Port Hudson, on March 14, 1863, to coöperate with the fleet. That night Farragut started to run the batteries with 9 vessels, carrying 116 guns. Most of the fleet, under the heavy fire brought to bear upon them, failed to get through, and put back; the Mississippi passed the lower batteries, then ran aground and, being under fire of three heavy batteries, was burned by her commander, the crew taking to boats and going back; the Hartford and Albatross made the passage and communicated with Porter's fleet above Vicksburg. Farragut's loss was 113 killed and wounded; one vessel had been destroyed and four disabled. The navy now had control of the mouth of Red river, and Banks, reverting to the execution of his turning movement by the Atchafalaya, recrossed the Mississippi, drove back the Confederate forces of Gen. R. Taylor, after two severe engagements at Fort Bisland and Irish Bend, in which he lost 353 men, and occupied Opelousas April 20, from which place he marched to Alexandria, on Red river, reaching there May 7, Taylor retiring before him to Shreveport and into Texas. He had captured a large number of prisoners and 22 guns, and Farragut had destroyed three gunboats, including those that had been taken from Ellet. Meanwhile he had received word from Farragut that Grant, March 23, had written him that should river transportation be secured he would send 20,000 men through the Tensas, Black and Red rivers to join in reducing Port Hudson, and at the same time a letter from Grant that he could

spare him an army corps to enable him to get up the Mississippi. Upon arriving at Alexandria Banks received a despatch from Grant, dated at Milliken's Bend April 14, proposing to send an army corps to Bayou Sara by the 25th, and requesting that Banks should, after the reduction of Port Hudson, send all the troops he could spare to Vicksburg. Banks assented to the proposition, saying that the troops could be supplied from New Orleans, but he was afterward informed by Grant, in a despatch dated Rocky Springs May 10 and received on the 12th, that he had crossed the Mississippi to Grand Gulf and was then in close pursuit of the enemy and, under the circumstances, could not retrace his steps, nor send the promised troops; and as he had heard and believed that Port Hudson was almost entirely evacuated, he requested Banks to join his command at Vicksburg. Halleck was intensely provoked at the action of Grant and Banks, and wrote sharply to both of them. That it was his intention that their two armies should unite or coöperate under the chief command of Banks, and first take Port Hudson, is evident from his letters. When these letters were received both Grant and Banks had fully committed themselves to the independent sieges of Vicksburg and Port Hudson.

The failure of Grant to coöperate with him was a keen disappointment to Banks. He could not join Grant for want of water transportation; he could not leave Port Hudson, with its large garrison, in his rear, without endangering New Orleans and all the Red river region; and therefore he concluded to concentrate his command and move immediately against Port Hudson. On May 14 he marched from Alexandria for Bayou Sara, crossed the Mississippi on the night of the 23d, and on the night of the 24th was in rear of Port Hudson, where he was joined next day by Gen. Augur, who had come up from Baton Rouge, defeating the Confederates at Plains' Store, on the 21st, with a loss of 86 killed and wounded, the Confederate loss being about the same. The investment was completed on the 26th with about 14,000 men, Gen. Frank Gardner, commanding at Port Hudson, having about 7,000 men. Gardner had been ordered by Gen. J. E. Johnston, May 19, to evacuate the place forthwith and move toward Jackson, but the order came too late. Under the impression that Gardner's force was much less than it was in reality, as it was reported much reduced by troops sent to oppose Grant in rear of Vicksburg, Banks ordered a general assault to be made on the morning of the 27th. The Confederate fortifications on the land side of Port Hudson consisted of a series of strong works connected by rifle-pits, with their flanks resting on the river above and below the place. Their length was nearly 4 m., and upon them were about 30 field-guns. The approach to them was difficult, being cut by ravines and for the most part covered by dense

groves of magnolia and other trees. The investing line was 7 m. in length. The brigade of Gen. Weitzel and the divisions of Gens. Dwight and Grover were on the right, Augur's division in the centre, and a part of Thomas W. Sherman's on the left. The assault, which was ordered simultaneously along the entire line, was preceded by a heavy fire of artillery, and at 10 a. m. Weitzel, on the right, commanding his own troops and Dwight's, moved forward fighting severely until late in the afternoon, and gaining some ground; Grover, on his left, gained and held commanding positions within 200 yards of the Confederate works. In the centre and on the left Augur and Sherman did not advance until 2 p. m., when they made a most determined effort, under a severe fire of canister and musketry, and reached the ditch of the works, but could not cross the parapet, and were withdrawn at night. The only advantages gained were the advanced positions held by Weitzel and Grover. The Union loss in the assault, in which 13,000 men participated, was 293 killed, 1,545 wounded, and 157 missing. The Confederate loss was about 235 killed and wounded. Regular siege operations began next day, siege-guns were planted, and constant skirmishing was kept up, during which, with some checks, the Union lines gained some ground, which was immediately intrenched. On June 10 a heavy artillery-fire was kept up, and at 3 o'clock on the morning of the 11th an attempt was made to get within assaulting distance of the works. A portion of the troops worked their way through the abatis, but were repulsed with loss and some captured. Meanwhile Banks had reorganized his command. Sherman, who had been severely wounded on the 27th of May, was succeeded by Gen. Dwight, and Gen. Grover was assigned to the command of the right wing, consisting of his own and Paine's divisions and Weitzel's brigade. The line was formed in this order from right to left: Weitzel, Grover, Paine, Augur, and Dwight. On June 14, the line of investment being well advanced, Banks made a second general assault at daylight from his left and right. Dwight, on the left, endeavored to gain entrance to the works by passing a ravine, while the main attack was made on the right by Grover and Weitzel. The assault ended in a bloody repulse, the Union loss being 203 killed, 1,401 wounded, and 188 missing. The Confederates had 22 killed and 25 wounded. The only advantage gained was a few yards nearer approach to the works on the right, and on the left an eminence commanding a strong part of them, and which later enabled Banks to get possession of the bluff within 10 yards of the enemy's lines. Siege-operations were continued and on the right saps were run to the very line of the Confederate works. On the left a mine had been prepared for a charge of 30 barrels of powder, and a storming column of 1,000 volunteers organized, when, during the

night of July 6, news was received that Vicksburg had surrendered. Gardner soon heard the news, and asked Banks to give him an official assurance of its truth, adding that if true, he requested a cessation of hostilities, with a view to consider terms for a surrender. Banks furnished him a copy of Grant's despatch, terms were agreed upon, and on the 8th Gardner surrendered 6,340 officers and men, 51 guns, about 7,500 muskets, large quantities of ammunition, and two river steamers. In all the operations against Port Hudson the fleet under Farragut had coöperated and assisted. The Union loss during the siege was 708 killed, 3,336 wounded, and 319 missing, an aggregate of 4,363. Incomplete Confederate returns show a loss of 176 killed and 447 wounded.

PORT HURON: city, port of entry, cap. of St. Clair co., Mich.; on St. Clair river near where it issues from the s. end of Lake Huron, at the mouth of the Black river; on the Grand Trunk, the Grand Trunk Western and the Pere Marquette railroads; 56 m. e. of Detroit. The city does a large business in lumbering, general commerce, and ship-building; contains new U. S. customhouse and postoffice (cost $250,000), county court-house, auditorium, hospital and home, and the Carnegie Library. The educational institutions are 16 public schools, including a high school, two business colleges, teachers' training school, two parish schools, the Academy of the Sacred Heart, Carnegie Library, and the county bar library, which contains about 12,000 volumes. There are over 30 church edifices. The four banks have a combined capital of $400,000. The government is vested in a mayor, who holds office two years, and a council of 20 members. The council elects the school and cemetery boards; the mayor appoints, subject to confirmation of the council, the police commission and the board of assessors. The board of estimate is elected by the people. The city owns and operates the waterworks. Port Huron was from 1686 an Indian village known as Detude, and was first permanently settled in 1790 by a French colony. It has been known as Fort Gratiot, La Rivière, Desmond, and Saint Joseph. It was incorporated as a town in 1838, and as the city of Port Huron in 1857. Port Huron is connected with Sarnia, Canada, by a railroad tunnel under the St. Clair river. Pop. (1900) 19,158; (1910) 18,863.

PORTIA, *pōr'shĭ-a*, the principal feminne figure in Shakespeare's *Merchant of Venice*. An heiress, beloved of Bassanio, she is compelled by the terms of her father's will to accept as her husband whichever of her suitors, choosing from among three caskets of gold, silver, and lead, shall select the one containing her picture. Bassanio, taking the leaden casket, is successful. Later in the play, disguised as a learned doctor of the law, she defends in court Antonio, Bassanio's friend, against the demands of Shylock.

There was another Portia, the daughter of Cato of Utica and wife of Marcus Brutus, who afterward became the assassin of Cæsar. According to the common story she killed herself after the death of Brutus, by swallowing live coals, but she more probably suffocated herself with the fumes of charcoal.

PORTICI, *pōr'tē-chē:* town and port in the province and administrative circle of Naples, Italy, between Naples and Vesuvius, and on the Naples-Salerno railroad. It is a suburb of Naples, well built, with many fine residences and villas. Just beyond it are the ruins of Herculaneum. There is a palace built in 1738 by Charles III., and an excellent agricultural school. The sea-bathing here is excellent. Pop. (1901) 4,538.

PORTICO, n. *pōr'tĭ-kō* [It. *portico,* a portico—from L. *portĭcus,* an arcade, a porch]: a walk covered by a roof supported on columns; an open space before the entrance of a building, fronted with columns; a piazza or arched pathway. A portico is usually attached to an important building, but sometimes detached as a shady walk. A portico is called tetrastyle, hexastyle, octostyle, and decastyle, according as it has four, six, eight, or ten columns in front. POR'TICOED, *a. -kōd,* furnished with a portico or porticoes.

PORTIERE, n. *pōr-tĭ-ār'* [Fr.]: a door-curtain.

PORTION, n. *pōr'shŭn* [F. *portion*—from L. *portĭōnem,* a share, a portion; *pars,* a part: It. *porzione*]: a part; a share; lot; final state; fate; a wife's dower or fortune. Portion, though not a legal term, is often used in the law of intestacy and legacies, to denote a sum of money given to a child in discharge of the obligation incumbent on a parent; and being often given on marriage it is called a marriage-portion. A parent is not bound at common law to give any portion to his children; but he often does so by will; and, in the event of his dying intestate, the law does so for him. When a testator by will leaves a legacy to a daughter, child, or person, toward whom he stands *in loco parentis,* and afterward in his lifetime gives the child a like sum of money, or even a less sum as a portion on marriage, such portion is *prima facie* presumed to be in satisfaction, or an ademption of the legacy, unless there is something in the will or settlement to rebut that presumption. See TOCHER. PORTION, v. to divide; to allot a share or shares. POR'TIONING, imp. PORTIONED, pp. *pōr'shŭnd:* ADJ. endowed with a portion. POR'TIONER, n. *-ėr,* one who divides or assigns in shares; in *Scot.,* the proprietor of a feu or small portion of land; also a Coparcener (q.v.): see also HEIRS-PORTIONERS. POR'TIONIST, n. *-ĭst,* one having an allowance from a foundation or college; the incumbent of a benefice having more rectors or vicars than one.—SYN. of 'portion, n.': share; parcel; division; allotment; quantity; dividend; part; dower; fate.

PORT ISABELLA, *ē-sâ-bā'lâ:* harbor in channel between Malamaui Island and the n.w. coast of the island of Basilan, Philippines. It has a naval hospital, a small arsenal and equipment for the repair of small vessels. Isabella de Basilan is the capital of the island.

PORT JACK'SON: the beautiful and extensive inlet on the e. coast in New South Wales, Australia, forming the well-sheltered harbor on the s. shore of which Sydney stands. See SYDNEY.

PORT JER'VIS: village in Orange co., N. Y.; on the Delaware and Neversink rivers, where the states of New York, New Jersey, and Pennsylvania meet; and on the N. Y., O. & W., the Erie, and the Milford & M. railroads; about 85 m. n.w. of New York city. It was settled in the last of the 18th century, and laid out as a village in 1826. The first permanent settlers were descendants of the French Huguenots and the Dutch, who settled the town of Deerpark. It is a popular summer resort on account of the many waterfalls nearby and the beauty of the scenery in general. Its waterpower and transportation facilities have contributed toward making the village of commercial and industrial importance. The chief manufacturing establishments are railroad shops; glove factories; silk mill; silver plating works; necktie factory; overall factory; saw factory; shirt factory; and other industrial works are a shoe factory, flour and planing mills, sash factory, printing works, and a number of smaller establishments which supply local needs. The principal public buildings are the Carnegie Free Library, cost $30,000; Port Jervis Board of Trade, two hospitals, the Y. M. C. A. building, Saint Mary's Orphan Asylum, and 10 churches. The educational institutions are public and parish schools, two private schools, a conservatory of music, and the public library, which contains about 15,000 volumes. The two banks have a combined capital of $230,000. The government is vested in a board of village trustees chosen by popular vote. Pop. (1890) 9,327; (1900) 9,385; (1910) 9,564.

PORTLAND, a. *port'land:* of or from the island of *Portland,* in Dorsetshire (see PORTLAND ISLE). PORTLAND STONE (see PORTLAND BEDS: PORTLAND STONE). PORTLAND CEMENT (see CEMENT).

PORTLAND: city, county-seat of Jay co., Ind.; on the Salamanie river, and on the Grand Rapids & I. and the Lake Erie & W. railroads; about 45 m. s.e. of Fort Wayne. It is in a productive agricultural region and in a natural gas belt. The chief manufacturing establishments are flour mills, cooperage, brick works, machine shops, creameries, and natural gas supply works. The educational institutions are the public schools and a free public library. The city owns and operates the electric-light plant and the waterworks. Pop. (1910) 5,130.

PORTLAND.

PORTLAND, *pōrt'land:* town in Middlesex co., Conn., on the Connecticut river opposite Middletown, and on the New York, New Haven and Hartford railroad, 14 m. s. of Hartford, 25 m. from New Haven. There are several churches, high school, weekly newspaper, national bank (cap. $150,000), and savings bank. There are manufactures of steam governors and tinware, and foundries and machine shops, but the principal industrial interests are in the quarries of sandstone in which about 1,200 men are employed. Pop. (1900) 3,856; (1910) 3,425.

PORTLAND, *pōrt'land:* city, port of entry, cap. of Cumberland co., Me., on Casco Bay, and on the Boston and Maine, the Grand Trunk, and the Maine Central railroads; 60 m. s.s.w. of Augusta, 105 m. n.e. of Boston, 292 m. s.e. of Montreal; lat. 43° 40′ n.; long. 70° 13′ w.; 3½ sq. m. It is on an attractive peninsula extending seaward 3 m. e. and w.; and has one of the best harbors on the coast—large, deep, safe, and land-locked—at whose entrance are Forts Georges, Preble, Williams, Levett, McKinley, and Scammel.

The city is laid out with considerable regularity; has sewage, gas, and electric light plants; receives its water supply from Sebago Lake, 17 m. distant; and is substantially built. The net public debt (1903) was $2,720,750; ass'd val. of all taxable prop., $49,293,415. 1902, Sept., there were 8 nat. banks (cap. $3,050,000), 2 state banks (cap. $200,000), 2 savings banks (surplus $575,000), 5 private banks, and 1 loan and trust company. The principal buildings in the city are the City Hall, built 1859 of olive-colored freestone, an elegant building with an attractive dome 160 ft. high and a hall with a seating capacity of nearly 3,000, cost $279,000; U. S. Post-office of white Vt. marble, with portico resting on Corinthian columns; U. S. Custom-house; court-house, Mechanics' Hall, United States Marine Hospital, Maine General Hospital; the Public Library, containing 54,597 volumes, and the library of the Maine Historical Society of 14,000 volumes; the Portland Society of Natural History; the Maine Eye and Ear Infirmary, Portland School for the Deaf, Old Men's Home, Home for Aged Women, Saint Elizabeth's Academy, Female Orphan Asylum, Episcopal and Roman Catholic Cathedrals, several noted colonial mansions, including the Wadsworth Mansion or 'Longfellow House'; the Dearborn Mansion and others; Public High School; P. Theatre; Cathedral of the Immaculate Conception (Rom. Cath.); St. Luke's Cathedral (Prot. Episc.); Me. Mutual Life Insurance Building; and the Payson Memorial (Congl.), First Bap., First Parish (Meth. Episc.), St. Steven's and St. Paul's (prot. Episc.), and the State street, Park street, Pine street, and St. Dominic's (Rom. Cath.) churches. The extensive public park system of Portland includes over 115 acres, and embraces the Eastern and Western Promenades, Lin-

coln Park, Fort Sumner and Fort Allen Parks, Deering's Oaks and Monument Square, in the latter of which stands an elaborate memorial to the Maine soldiers who were killed in the Civil War. There is an observatory on Munjoy Hill.

The graded school system of Portland is excellent and managed by a school board of 12 members, including three women, who are elected as members at large. The mayor is chairman ex-officio of the board. There are two high schools, numerous grammar and primary schools, and 9 kindergarten schools, besides a manual training and teachers' training school. The cost for maintaining the schools for 1903 was $158,175.21. Among institutions are St. Elizabeth's Acad. (R. C.); Portland School for Med. Instruc.; Portland School for the Deaf; the State Reform School.

Portland has 52 churches, among which are 3 Baptist, 3 Roman Catholic, 14 Congregational, 4 Episcopal, 3 Lutheran, 15 Methodist, 1 Presbyterian, 2 Second Advent, 2 Unitarian, and 5 Universalist churches. No city of its size has more benevolent societies.

In the earlier days Portland had an extensive and valuable trade with the West Indies, a portion of which it still enjoys. It has large commerical interests and is noted for its exports of grain, fruit and live stock. The exports for the year 1905 amounted to $13,934,336, and the imports $1,053,684. The harbor is of easy access, capacious, safe, deep enough for the largest vessels, and rarely obstructed by ice; hence it is an important seat of winter traffic between Great Britain and Canada. There are docks and other facilities for the repair of vessels. The greater part of the steamship carrying trade to and from foreign parts is in British ships. The coasting trade is extensive. Portland has about 700 manufacturing establishments, with an annual output valued at over $12,000,000. The industries include boot and shoe factories, rolling-mills, foundries, machine shops, locomotive works, engine and boiler works, petroleum refineries, match factory, chemical works, carriage and sleigh factories, manufactories of stoneware, jewelry, edge tools, varnishes, soap, meat-packing establishments, cooperage shops, lumber mills, etc. The capital invested in these industries according to last census was $6,991,000. Shipbuilding is still carried on, though of less importance, relatively, than in former years. Fishing and the shell-fish industry are extensively pursued.

There is an efficient fire department, under the charge of a chief and four assistants. The department is managed by a committee of the city government; the cost for 1903 was $87,386.25.

There are United States courts, circuit and district; supreme-judicial; superior; probate and municipal courts. The police department is under the charge of a

chief and two deputies. The mayor is at the head of the department. The cost of maintenance in 1903 was $70,429.89. The city is governed under a charter granted in 1863, subsequently amended, and later acts, by a mayor elected annually, a bicameral council, consisting of 36 members, 3 councilmen and 1 alderman from each ward, and city officials, most of them elected by the people. The city marshal, commissioner of public works, and members of the Board of Health are appointed by the mayor. The members of the Board of Education are elected by popular vote. The city has waterworks, electric lighting system and electric street railways.

The site of P. was known among the Indians as Machigonne. An English settlement was made on the peninsula 1632, which was destroyed by the Indians 1676, as was its successor by the French and Indians 1690. In 1775 the village, then known as Falmouth, was bombarded and destroyed by a British fleet; 1786 was incorporated under its present name; and 1832 received a city charter. Nearly one-third of the city was destroyed by fire 1866, causing a loss of property valued at $10,000,000. Pop. (1900) 50,145; (1910) 58,571.

PORT'LAND: city, port of entry, cap. of Multnomah co., Or.; on the w. bank of the Willamette river, 12 m. above its junction with the Columbia, and on the Union Pacific, the Northern Pacific, and the Southern Pacific railroads; 53 m. n.e. of Salem, 122 m. by water from the Pacific Ocean, 530 m. by water n. of San Francisco; lat. 45° 30′ n., long. 122° 27′ w. The surface has a gradual ascent, providing natural drainage without impeding street travel. There are about 2 m. of excellent wharfage along the river front; and four bridges and several ferries connect the city with Albina and E. Portland, on the opposite side of the river. The business centre comprises several streets, parallel with the river, all paved with granite blocks. Front st. is occupied almost exclusively by wholesale commercial houses, and First st. by retail. The residence portion begins about 6 streets from the business centre, and extends a mile back from the river, where the surface reaches a height of 1,000 ft. At this point Mts. Hood, Rainier, Adams, St. Helens, and Jefferson, all perpetually snow-capped, are discerned readily under favorable conditions. For a city of its age, P. is built in a remarkably substantial manner: Its location at the head of direct navigation from the ocean, and at the terminus of three great railroad systems, gives it exceptional commercial importance and attracts to it vast wealth.

Portland being a modern-built city has numerous and costly buildings; a city-hall, post-office and custom-house, each occupying an entire block; Chamber of Commerce Building, Public Library (27,000 volumes), Union Railroad Depot, Northwest Industrial Exposition Building,

the *Oregonian* building, Marquam Grand Theatre, Weinhard Building (200 x 200 feet), Medical and Law Schools of the State University, the Dekum and Worcester Buildings, and many fine residences. There are numerous charitable institutions, including the Good Samaritan, Saint Vincent and Portland Hospitals.

In 1902 there were 4 nat. banks (cap. $1,100,000), 3 state banks (cap. $585,000), 1 private bank (cap. $250,000), 1 trust company (cap. $150,000), branch of the Bank of Brit. Columbia (home cap. $3,000,000), branch of the London and San Francisco Bank (home cap. $2,100,000), and the Oregon and Washington Savings Bank. There were (1902) 31 periodicals, of which 2 were daily, 14 weekly, 1 semi-monthly, and 13 monthly publications.

The city has direct steamship communication from its wharves to San Francisco and to points on Puget Sound, and the Alaska coast; and its ships largely, especially of manufactures of lumber, to China, Japan, and S. America. Its shipments by rail of products and manufactures to Brit. Columbia and e. and s.w. cities of the United States are large and increasing annually. The value of imports of merchandise for the fiscal year 1905 was $2,611,339; of exports $7,722,905.

P. is the principal point on the Pacific coast where pig-iron is manufactured; high grade and apparently exhaustless iron beds extend along the Columbia river from a point 40 m. n. of the city to another 10 m. s. The principal manufactures of P. are lumber, flour, woolen goods, furniture, cordage, beer, wagons and carriages, engine boilers, clothing, boots and shoes, canned goods, and planing mill products. There are also creameries, paper bag factories, coffee and spice mills, paint works, saddlery and harness factories, stock yards, soap and candle works, and an immense dry dock recently completed. Excellent water power for manufacturing purposes is obtained from the Willamette Falls, at Oregon City, 12 miles distant. The power is transmitted by electricity and is also used for lighting the city and for operating the electric street railways. There were (1900) 1,064 manufacturing establishments, which employed 8,572 hands and yielded products valued at $23,451,132. The wholesale trade aggregated (1903) $15,000,000, the combined jobbing and wholesale trades $175,000,000.

The city has an excellent public school system with an enrolment of over 15,000 scholars. It also has the Portland University, Portland Academy, Saint Helen's School for Girls, the Bishop Scott School, and the medical and law schools of the State University. There are many churches here, all leading denominations being represented.

P. is governed by a mayor elected every two years and a unicameral council. A majority of the city officials are

appointed by the mayor or nominated by him with the consent of the council. The members of the Board of Education are elected by the citizens. The system of waterworks, owned by the city, cost nearly $4,000,000, and includes 155 miles of mains. There is a sewer system covering 90 miles. The streets are lighted by electricity at a cost of about $70,000 per annum. The police department costs annually about $100,000, and the fire department about $125,000. There is an annual expenditure for public education of nearly $250,000. The annual cost of maintaining the city government is over $960,000. In 1903 the net debt of the city was $5,637,000, and the assessed property valuation $44,261,000.

The site of P. was staked off in a pine forest by A. L. Lovejoy and A. M. Overton 1843; the first log cabin was built 1844; 16 blocks of land bordering on the river were surveyed and plotted 1845; the first business building was erected the same year; the town, named from the city in Me., was incorporated 1851; and the city suffered severely by a fire 1873, Aug. 2. In 1891 Albina and East Portland were annexed. Pop. (1900) 90,426; (1910) 207,214.

PORT'LAND: post-town and parish in St. John co., N. B.; on St. John harbor and river, adjacent to the city of St. John (q.v.). A suspension bridge connects it with Lancaster. The town has independent gas and water works, street railroads, and several schools and churches. There are large steam saw-mills, iron foundries, and ship-yards, and near by are rich mines of plumbago and sulphate of barytes. The town has considerable foreign and domestic trade through St. John. Pop. 12,520. Annexed to St. John in 1889.

PORT'LAND BEDS: division of the Upper Oolites (q.v.), occurring in England between the Purbeck Beds and the Kimmeridge Clay; and so named because the rocks of the group form the promontory of the Isle of Portland. They consist of beds of hard oolitic limestone and freestone, interstratified with clays, and resting on light-colored sands, which contain marine fossils. The corals found in the sands are often converted into flints, the original structure being beautifully preserved in the hard silex. The beds may be traced from the Isle of Portland, capping the oolitic hills as far as Oxfordshire. The fossils are chiefly mollusca and fish, with a few reptiles.

PORT'LAND CEMENT. This is a hydraulic material made by calcining at nearly white heat an artificial mixture of carbonate of lime and clay, in certain definite proportions, and grinding the resulting clinker to powder. It was first made by Aspdin, in England, in 1824. See CEMENT.

PORT'LAND ISLE: rocky peninsula projecting into the English Channel from the shore of Dorsetshire, 17 m. w.s.w. of St. Alban's Head. Its appearance suggests the shape of a *beak*, whence it is called also the *Bill of Portland*. It is 9 m. in circumference, is composed of oolitic limestone, and slopes southward, with an even surface from the height of 490 ft. to 30 ft. above sea-level. Its sides are extremely rugged, and are worn into fantastic caverns by the furious action of the waves. The peninsula is supposed to have been formerly an island, but for ages it has been connected with the mainland by *Chesil Bank*, an extraordinary ridge of loose shingle, which, after extending n.w. about 10 m. in a straight line, close to the shore, joins the mainland at Abbotsbury. S.w. winds prevail on this part of the coast; and during their continuance the long ridge of Chesil Bank is lashed by a frightful sea, and is the scene of frequent shipwrecks. —A long narrow inlet of the sea, called the *Fleet*, extends between Chesil Bank and the shore, and is the haunt of numerous wild-fowl.—*Portland Castle*, in the n. of the isle, is a ponderous building, erected 1520 by Henry VIII. as a defense for this part of the coast. The peninsula furnishes the famous Portland Stone (q.v.).—Portland Breakwater, built of stones obtained on the island (see BREAKWATER), has provided a secure harbor for hundreds of the largest ships; connected with it are a naval station, harbor of refuge, and batteries.—*Pennsylvania Castle*, in a most romantic district on the e. coast, was built by John Penn, grandson of the founder of Pennsylvania.—*Rufus Castle*, commonly called *Bow and Arrow Castle*, also on the e. coast, now a ruin, is generally said to have been built by William Rufus. On Portland Bill, the s. extremity of the island, are two light-houses, one 130 and the other 197 ft. above sea-level.—Between the s. point and the *Shambles*, three m. s.e., a dangerous surf, well known as the *Race of Portland*, is raised by the rush of the impetuous tides.—The convict prison, near the e. coast, erected 1848, accommodates more than 1,500 convicts, besides the officers, and is maintained at an annual cost of more than £50,000, or at the rate of £33 per prisoner.—The inhabitants of the island long remained a peculiar people, intermarrying, and preserving, generation after generation, many curious customs of their ancestors. The island itself is remarkable chiefly for its abundant supply of excellent spring water, for its building-stone, and for its breed of sheep, the fine-flavored flesh of which is known as Portland mutton. Pop. of the parish of P. (1871) 9,907; (1881) 10,046; (1891) 11,000.

PORT'LAND SA'GO: see ARUM.

PORTLAND STONE—PORTLAND VASE.

PORT'LAND STONE: English building stone, of which many of the principal buildings of London, including St. Paul's Cathedral, Somerset House, and many of the churches are constructed; the oolitic limestone of Dorsetshire, constituting geologically the *Portland and Purbeck Beds*. The quarries are chiefly in the islands of Portland and Purbeck, and in the Vale of Wardour. The quantity raised is very large. During the heavier works at the Portland Breakwater (see BREAKWATER) 730,000 tons per annum were required for that structure alone, and about 30,000 to 40,000 tons are sent annually to London and other places. There are three different qualities of the stone in the same quarry: the uppermost contains numerous fossils, and is of coarse grain; it is used chiefly for rough work, such as foundations: it is called Roach by the quarrymen. The middle bed is much broken, and is called the *rubble* or *rubbly bed*, and is of little value; and the lower one is fine, dull white, and compact, and is called the *whit*, or *best bed*. This last is used for fine building purposes. Analysis of this stone by Prof. Daniell shows:

Silica,	1·20
Calcium Carbonate,	95·16
Magnesium Carbonate,	1·20
Iron and Aluminium Oxides,	0·50
Water and loss,	1·94

Also there is often a trace of bitumen.

The name Portland Stone is in the vicinity of New York often applied to a sandstone coming from quarries at Portland, Middlesex co., Conn., on the Connecticut river near Middletown, Conn. It is a red sandstone, and many buildings in the city of New York have been constructed with this material for their fronts.

PORT'LAND VASE: one of the most valued relics of antiquity; beautiful cinerary urn, of transparent dark-blue glass, found about the middle of the 16th c. in a marble sarcophagus near Rome. It was at first deposited in the Barberini Palace at Rome (hence it was often called the Barberini Vase); it then became (1770) the property, by purchase, of Sir William Hamilton (q.v.), from whose possession it passed into that of the Duchess of Portland. In 1810 the Duke of Portland, one of the trustees of the Brit. Museum, allowed it to be placed in that institution, retaining his right over it as his property. In 1845 a miscreant, apparently from an insane love of mischief, or ambition for notoriety, dashed this valuable relic to pieces with a stone. Owing to the defective state of the law, only a slight punishment could be inflicted; but an act was immediately passed, making such an offense punishable with imprisonment for two years, and one, two, or three public or private whippings. The pieces of the fractured vase were carefully gathered up, and afterward united in a very complete manner; and thus repaired, it remains in the Museum, but is not shown to the public. A small number of copies of the P. V., made many years ago by Wedgwood, were sold at 25 guineas each. (For further details, see GLASS.)

PORT LOUIS, *pōrt lô'ĭs*, F. *pōr lô-e':* city, cap. and principal port of the British colony of Mauritius; on an inlet on the n.w. coast, inclosed by a ring of lofty hills. Its streets, though narrow, are straight, furnished with foot-paths, and macadamized. The streets are narrow, laid out at right angles with basaltic curbstones, and shaded by large acacias. A mountain stream traverses the town. The town and harbor are protected by Forts Adelaide and George. The principal buildings and institutions are the Roman Catholic and Protestant cathedrals, the barracks, theatre, hospital, botanical gardens, an observatory, and library. It is the chief commercial port of the island and a coaling station for the British navy. Great damage and loss of life were caused by a hurricane in April, 1892. Pop. (1901) 52,740.

PORT MAHON, *pōrt mâ-hōn'* (anc. *Portus Magonis*): city and port of Spain; on the island of Minorca, of which it is the capital, at the head of a bay which forms one of the best harbors on the Mediterranean. Fishing, fishcuring, agriculture, and stock-raising are the chief occupations. In the bay are several rocky islets, on one of which stands an arsenal, on a second a lazaretto, and on a third a naval hospital. The harbor is strongly fortified. The exports are brandy, wine, dried fruits, agricultural produce, etc.; and the imports, grain, wearing apparel, tobacco, sugar, coffee, cacao, leather, hats, and other manufactured goods. Its trade amounts to about $1,000,000 annually. Mahon was occupied by the English in 1708. It was taken from them, after a memorable siege, by the French under Marshal Richelieu on June 28, 1756. Admiral Byng was shot for failing to relieve it. It was restored to the English in 1763; and taken by the Spaniards in 1782. It was retaken in 1798, and finally given up to the French by the Treaty of Amiens in 1802. Pop. (1901) 18,123.

PORTMANTEAU, n. *pōrt-măn'tō* [F. *porte-manteau*—from *porter*, to carry; *manteau*, a cloak—from mid. L. *mantum*, a short cloak]: a leather case or trunk for clothes, etc., in travelling; *formerly*, a leather case attached to a saddle behind the rider.

PORTO ALEGRE, *pōr'tō â-lā'grā:* capital city of the state of Rio Grande do Sul, Brazil, about 710 m. from Rio Janeiro, on the left bank and near the mouth of the Jacuhy river, and n.w. of the Lagoa dos Patos, on railroads connecting it with the interior. The streets are broad and clean with handsome squares. The charm of the city and its surroundings gave it the Portuguese name of 'Smiling Harbor' (Porto Alegre). A hospital, theatre, and cathedral are the main public buildings. There are good schools and a large colony of Germans, who handle most of the city's commerce. This consists chiefly of the produce of the rich agricultural and grazing lands. It has several steamboat lines, to Rio Janeiro, to the German colony of São Leopoldo, etc. The imports are

mostly English and German wares. Porto Alegre was founded in 1742 by colonists from the Azores. Pop. 100,000.

PORTO CABELLO, *pōr'tō ka-bĕl'ō,* or PUERTO CABELLO, *pwĕr'tō kâ-bāl'yō:* town in Venezuela, on the Caribbean sea; about 60 m. w. of Caracas. A part of the town is on a small island, which is connected with the mainland by a bridge. There is a large and safe harbor; and steamer connections with La Guayra, the port of Caracas, and railroad connection with Caracas. There is considerable trade in fruit and grain. Pop. 10,000.

POR'TO FERRA'JO. See ELBA.

PORTO MAGGIORE, *pōr'tō mâd-jō'rā:* town in the province of Ferrara, Italy, 22 m. from the Adriatic, though it is said to have anciently been a seaport of the Adriatic. It is situated among the lagoons of Comacchio as to form an island reached by bridges. Owing to its situation, the inhabitants suffer severely from malaria; but it has extensive trade in cattle and agricultural products. Pop. of commune 15,150.

PORTO MAURIZIO, *pōr'tō mow-rĭ'tsĭ-ō:* seaport town of n. Italy, the capital and chief town of the province of Porto Maurizio. It is situated on a promontory projecting into the Ligurian sea, 14 m. from San Remo, 58 m. by rail s.w. of Genoa, and 41 m. by rail e. by n. of Nice. The harbor is formed by two moles and is entered from the s.-s.w. Olives are produced in considerable quantities, and there is an extensive shipping trade in fish, agricultural produce, and olive-oil. The town consists of an old section on a hill and a new section near the sea, the latter containing a fine church, a theatre, a technical school, a school of navigation, and a library. Porto Maurizio is a popular winter resort. Pop. over 7,000. Pop. of province about 145,000.

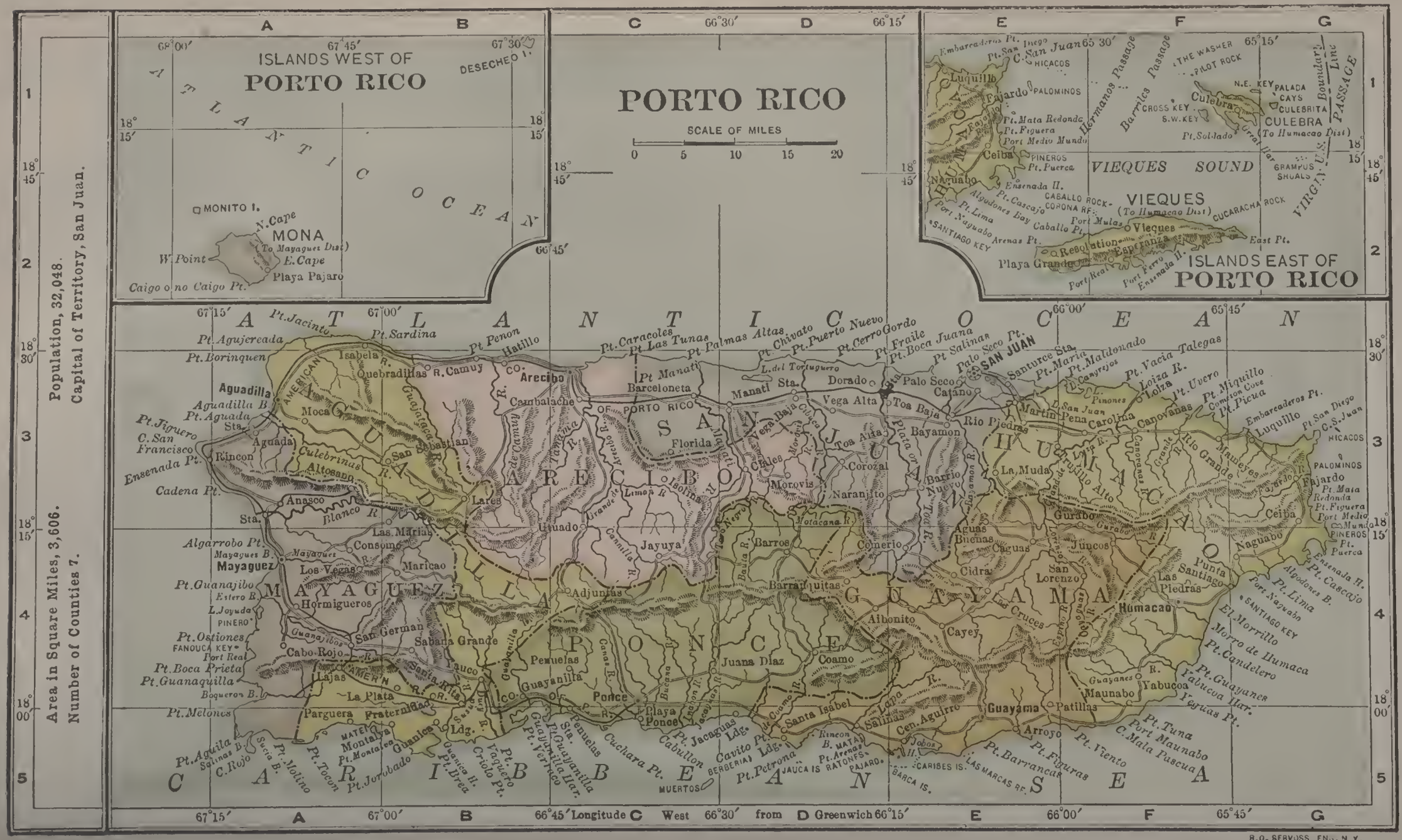
PORTO RICO, *pōr'tō rē'kō* (Sp. PUERTO RICO, *pwĕr'tō rē'kō*): island in the W. Indies, ceded by Spain to the United States by the Treaty of Paris, Dec. 10, 1898; one of the Great Antilles. It lies east of Hayti or San Domingo; lat. 17° 50′—18° 30′ n., long. 65° 30′—67° 15′ w. The estimate of its area commonly accepted is 3,668 sq.m., or, without Vieques, 3,550. Adjacent and subject to the same jurisdiction are the small islands Vieques and Culebra, in the passage between Porto Rico and the Virgin group; Mona, between Porto Rico and Santo Domingo, and a few other islets.

Topography, Climate, and Hydrography.—A chain of mountains, the summits of which are ranged in two nearly parallel lines with intervening tablelands and high valleys, crosses the island from w. to e., culminating in the peak called El Yunque (3,609 ft.) in the n.e. Lower transverse ridges, running northward and southward from the principal chain, sink into the wide plains which border the coasts, forming a large number of pretty

scenes and valleys. The eastern and northern slopes, valleys, and plains receive an abundant rainfall through all the year, while the regions on the other side of the mountains are often parched by drought. The mean temperature at San Juan ranges in different years from 78° to 82° F., the maximum on record being 99° and the minimum 57° F. The climate of the highlands, where the mean annual temperature is 72° F. or less, is very agreeable all the year, although it contains an excess of moisture at some points. (See also paragraph *History* for statement in regard to hurricanes.) The island is well watered. Streams are uncommonly numerous, and some of them are navigable for small craft near their mouths. On the n. coast 17 rivers flow into the sea; on the e. coast, 9; w. of Cape Mala Pascua on the s. coast, 16; on the w. coast, 3, beside the outlets of several fresh-water lakes. There are several falls of considerable size, the largest being Comerio and Rio Blanco falls. Harbors are those of San Juan, Culebra, in the island of Culebra (at both of which United States naval stations are established), Guanica, Hobos or Jovos, Guayanilla and Ensenada Honda.

Mineral Resources.—Casual explorations have shown the presence, in several places, of magnetic and specular iron in large quantity, especially in the eastern part of the island; copper, gold, agate of good quality, garnet, malachite, manganite, etc., are also found. Here, as throughout the Antillean regions, the older metamorphic rock and conglomerates, even on the summits of the mountains, are covered with limestone formations.

Flora and Fauna.—The island was once covered with a beautiful virgin forest, but unfortunately 'forestry regulations,' according to Robert T. Hill, 'have not been more wisely observed in Porto Rico than elsewhere in the West Indies'; however, in the highlands the conditions, both in soils and climate, are favorable to vegetation. The trees which are noteworthy on account of their size or beauty, are the several species of palms and tree-ferns, tillandsia, *Cocobola macrophylla*, lobelia, etc. Useful woods are the ausubo, cedar, aceitillo, mahogany, laurel, West Indian sandalwood, ebony, and willow and a large variety of dyeing wood. Trees producing edible fruits and plants valuable medicinally are especially numerous. The fauna includes no indigenous quadrupeds; there are no beasts of prey or wild animals of any kind, and unlike the Caribees, or the tropical continent, Porto Rico is not infested by poisonous snakes and other noxious reptiles, though centipedes and the tarantula are not unknown. There is a large variety of bees. Birds are multitudinous and are noted both for their fine singing and beauty of their plumage; they include the canary-bird, nightingale, parrots, and doves. The tortoises of the island are said to be closely allied to those of the Galapágos Islands (q.v.). Some of the rivers are well


PORTO RICO
SCALE OF MILES
0 5 10 15 20
ISLANDS WEST OF
PORTO RICO
ATLANTIC OCEAN
MONITO I.
N. Cape
MONA
(To Mayaguez Dist.)
W. Point
E. Cape
Playa Pajaro
Caigo o no Caigo Pt.
DESECHEO I.
ISLANDS EAST OF
PORTO RICO
VIEQUES SOUND
VIEQUES
(To Humacao Dist.)
CULEBRA
(To Humacao Dist.)
VIRGIN IS. U.S. Boundary Line
PASSAGE
Area in Square Miles, 3,606.
Population, 32,048.
Number of Counties 7.
Capital of Territory, San Juan.
AGUADILLA
AGUADA
ARECIBO
SAN JUAN
HUMACAO
MAYAGUEZ
PONCE
GUAYAMA
CARIBBEAN SEA
Longitude West from Greenwich
R.O. SERVOSS, ENG. N.Y.

stocked with fish, and the fisheries, on the n. coast especially, are valuable.

Agriculture, Commerce, and Manufacture.—Compared with that of the other West Indian islands, Porto Rico's agriculture is remarkably diversified, the chief products being coffee, annual yield about 60,000,000 pounds; sugar nearly 205,000 tons; tobacco about 1,500,000 pounds; cotton; tropical fruits, such as oranges and pine apples, which are grown for export in increasing quantities; rice, of the upland variety; and such vegetables and nutritious fruits as are required for the consumption of the inhabitants. Coffee, once the main industry of the island, is now stagnant. Probably one-half of the estates that were damaged or destroyed by the hurricane of 1899 have not been restored, and many of those that were restored are badly handicapped by heavy mortgages at high rate of interest, the price obtained for the product not being sufficient to pay the debts. The acreage dedicated to the coffee culture is gradually decreasing, as no new trees are planted. Unless protection is secured for this industry it will disappear altogether from the island. When the Americans occupied the island there were 250 sugar mills and about 20 centrals. The latter have been increased in number as well as in capacity, due to the protection enjoyed by Porto Rican sugar in the United States markets, while the old-fashioned mills are gradually disappearing by their constant conversion into modern centrals. There are some very large alcohol distilleries in the island. Next to sugar the tobacco industry takes the lead. But although the number of acres of land dedicated to tobacco has increased tenfold during the last quinquennium, and the quality has been much improved, it may be safely stated that the industry has not yet attained its full development. The cocoanut industry is also very promising. At present there are over 2,500 acres dedicated to cotton, and much effort is being made by merchants of San Juan to encourage farmers to increase the acreage as well as improve the quality. There is a ginnery in San Juan. Before the American occupation the oranges and pineapples of Porto Rico were famous for their flavor and sweetness, but they grew wild and in such small quantity that seldom were they exported. Since then, however, the fruit industry has undergone such a favorable change, that while the number of acres dedicated to oranges or pineapples has not been exactly estimated, yet the former are now shipped to the States in large quantity, and in 1907 more than 150,000 boxes of pineapples left the port of San Juan. Rice, corn, bananas, and beans are also raised, but not in sufficient quantity for export trade. Cattle-raising is an important industry, the best pastures lying on the northern and eastern slopes. The domestic merchandise shipped to the United States during the year ending Dec. 31, 1908,

was valued at $25,885,776; from the United States, $22,360,366. The foreign trade, year ending Dec. 31, 1907, was as follows: Imports, $3,580,887; exports, $4,899,372. Manufactures are: sugar, rum, cigars, cigarettes, straw hats, preserved fruits, articles of wood, etc. The salt works of the island produce about 10,000,000 pounds annually.

Railways and Roads.—The undertaking to encircle the island with a railway dates from 1888. By 1892 there had actually been built 119 m. Since that time the lines have been extended to 292 m.; but the system is still inadequate. It is supplemented by highways, some of which are excellent.

Finance.—The annual budget of the island has varied from three to four millions of pesos, aside from city budgets. This budget included from 1,250,000 pesos to 1,500,000 pesos which the island contributed to the national expense, under the subheads of minstries of colonies, war, and navy. In the year 1897-98 the expenditures were 3,536,342 pesos, and the income 3,930,500 pesos.

The budget for 1898-99 (the first year under the home rule system) showed expenditures of 4,446,952 pesos, and income of 4,782,500 pesos. The first budget under the civil government established by the Foraker Act was about $2,000,000 (expenditure); that of the year 1906 about $2,500,000 (expenditure). The main source of income under the Spanish rule was from custom duties on imports and exports, especially on sugar, as up to 1901 there was no regular system of taxation in the island. Porto Rico, however, was always able to meet its budget and besides have a surplus in its treasury. It is from this surplus that Spain drew $2,000,000 to fight the Cubans in 1895-96. This money was lost to the island. The taxable property of the island at present is valued at $100,000,000.

Porto Rico has had several currencies. The macuquina, which was introduced in the island as early as 1800 from Venezuela, was the legal tender up to 1857. This currency was very imperfect; it consisted of pieces of solid silver and copper, irregularly cut, bearing a poor imitation of the Spanish coat of arms, and had a discount of 12½ per cent., on the Spanish national currency. To withdraw the macuquina money the Spanish government sent to the island 1,350,000 Spanish pesos, the island losing 215,466 pesos, which was necessary to cover the difference in value. In 1867 the island of Santo Domingo having gained its independence, its money, known as calderilla, was brought to Porto Rico. The same year a royal decree allowed the free circulation of foreign money in the island, fixing a relative value on the basis of the Spanish legal tender. This measure brought abundance of money into the island. In 1879 a royal order made the Mexican peso the official currency,

giving it a value of 95 cents American money; and another royal order in 1881 authorized its free circulation. In 1895 the government ordered the exchange of the Mexican money for what was called the 'special currency;' 6,426,393 pesos were thus exchanged, at a cost to the island of $1,210,000 for recoining, transportation expense, etc. This special provincial money was finally exchanged for the American legal standard at a discount of 66⅔ per cent.

Banks.—These institutions were unknown in Porto Rico up to 1888, in which year the Spanish Bank (known now as the Porto Rico Bank) was organized, but not opening its doors until Feb., 1890; capital 1,500,000 pesos, 750,000 paid up; in 1898 it had issued notes to the extent of $2,587,445; head office in San Juan. The Banco Territorial-Agricola (Agricultural Bank) was established in July, 1894; capital 2,400,000 pesos; head office in San Juan. The Banco Popular was also organized in 1894 with a capital stock of $18,000; head office in San Juan. The Crédito y Ahoro Ponceño (a savings bank) was organized in Nov., 1894, with a capital stock of $200,000; head office in Ponce. American Colonial Bank was established in 1899 with a capital stock of $400,000; head office in San Juan. National Bank, branch in San Juan, Porto Rico, opened in 1902 with a capital stock of $100,000. Union Bank of Halifax, in San Juan, with a capital stock of $1,500,000, was established in August, 1906.

Population and Education.—On Nov. 10, 1899, the number of inhabitants was 953,243 (whites, 589,426); mulattoes, 304,352; negroes, 59,300; Chinese, 75). It is to be observed that while the census taken in 1887 shows a black population of 76,985, and that taken in 1897 reduces the figure to 75,824, the census of 1899 further reduces the figure to 59,300. If this decrease should continue for a number of years, the black race would eventually disappear from Porto Rico, unless there is an immigration of that race from the other West Indian islands in the future. The white population was divided into three classes: (1) the aristocracy of the country, not seldom colonial branches of excellent families of Spain; (2) trades-people in the towns; (3) a peasantry plagued with anæmia, the so-called *jibaros*, of whom Mr. van Middeldyk says: 'Intellectually the *jibaro* is as poor as he is physically. His illiteracy is complete.' But the *jibaro*, it must be admitted, has had hard luck. The descendants of the early Spanish colonists and in the majority of cases of the Indians, they retained the superstition of the former and a little of the natural timidity, and reserve of the latter. These atavic traits, added to the fact that they have been robbed and deceived by the Spanish merchants, who took advantage of their ignorance, reducing them to a sort of serfdom worse than slavery, have made them what they are today,

a physically degenerated class with no ambition whatever. They are, however, naturally bright and generous, and once their confidence has been gained and their mistrust dispelled, they are most hospitable and loyal. Above all they love peace and fear the law. Education, which they never had a chance of obtaining, and the development of the interior, will improve their way of living, awake their dormant intellect, and redeem them from their debased condition. Pop. (1910) 1,118,012.

The members of the first class who were rich and could receive a liberal education went to Europe or the United States, where they became lawyers, physicians, engineers, etc., and returned to their country to practice their profession. Those who were poor were compelled to remain home, contented with what knowledge could be acquired in a very reduced number of public schools, a normal school, and a high school in San Juan (where the degree of bachelor of arts could be obtained); the second and third classes did not receive any education at all, except in rare cases, no efforts being made by the government to raise the standard of education either by making it compulsory or by furnishing sufficient public schools, the number never exceeding 124 and the system being extremely antiquated. In 1899 only 16 or 17 out of 100 Porto Ricans could read and write. Under the new government the number of schools was increased to 1,104; local authorities were required to provide suitable school buildings; primary instruction was made compulsory; and existing institutions of higher education were supplemented by normal trades, and high schools.

History and Government.—On Nov. 19, 1493, Columbus landed on the western coast, and named the island San Juan Bautista. On Aug. 14, 1509, Juan Ponce de Leon, who had discovered gold on the island, was appointed governor by King Ferdinand. The natives, who called their island Borinquén, and had chiefs of their own, were enslaved and forced to work the placer deposits. In June, 1511, the Indians slaughtered about one-half of the Spanish force, but were reduced to submission. The aboriginal population at that time probably numbered from 80,000 to 100,000 (not 600,000—an estimate often repeated, but resting upon a wholly unwarranted statement in Friar Abbad's *Historia*); on April 27, 1515, Counselor Sancho Velasquez wrote to the king that, excepting the Indians assigned to the royal estate and those of the crown officers, 'there are not 4,000 left.' The greater number of the natives perished; some poisoned themselves; other emigrated to the neighboring islands—so cruelly were they treated—and the rest gradually blended with the invaders. About this time it became customary to refer to the capital as 'Puerto Rico,' instead of Capárra. Thus modern usage precisely reverses the original intent; for the name Columbus gave to the island is applied only to its chief town, while the name by

which Ferdinand designated the settlement on the northern 'port' has supplanted both 'Borinquén' and 'San Juan Bautista.' On Feb. 26, 1521, Ponce de Leon sailed on his second expedition to Florida. Again disappointed and repulsed, he did not return to Porto Rico, but sought refuge in Cuba, where he died. On April 18, 1533, the authorities of the capital petitioned the empress against the further introduction of African slaves. It appears from a letter written by Governor Lando to the emperor in 1534, that very few negroes had been sent to the island up to that time; but a few years later they arrived in large numbers, taking the place of the Indian laborers. Palm Sunday, 1554, the principal settlement on the s. coast was destroyed by a landing party from three French ships. On Nov. 22-24, 1595, Sir Francis Drake, commanding a strong fleet, attacked Jan Juan. That port was well defended and the English withdrew. Two years later a body of English troops, under the Duke of Cumberland, occupied San Juan, then garrisoned by a small body of troops, for a few months. From Sept. 25 to Nov. 2, 1625, San Juan was besieged by a Dutch fleet; landing was effected, but the besiegers were compelled to withdraw with heavy losses. The city was under the command of Don Juan de Haro. From 1640 to 1780 expeditions were equipped in Porto Rico for the long struggle with the buccaneers. In 1702 some English troops landed at Arecibo, but were defeated by a body of militia under Captain Correa. On April 17, 1797, an English fleet, 15 ships and several transports, under Admiral Harvey, with troops commanded by Sir Ralph Abercromby, numbering over 6,000 strong, appeared before San Juan; the city was under the command of Don Ramón de Castro, who gathered with him among regulars, militia, and volunteers, about 4,000 men. The forts were manned by Frenchmen, then the allies of the Spaniards. The invading force landed back of the city by the place known as Cangrejo, and marched on to the city, but before they came to the San Antonio bridge, they met such strong resistance, both from the infantry and artillery on the forts, that they were compelled to re-embark, apprehending an attack from the rear, with great losses both in war materials and men. The ineffectual siege was maintained only 15 days. This attack and that made by the Dutch in 1625 are perhaps the most important events in the history of the island since the conquest from a military standpoint. To the city, as a reward for gallant resistance at this time, was granted the privilege of adding the words 'very noble and very loyal' to its coat-of-arms. Loyalty was strikingly evinced early in the following century. On Dec. 20, 1819, in Feb., 1825, and Nov., 1829, expeditions from Colombia landed in Porto Rico, to encourage the inhabitants to rebel against Spain; they were not welcomed. Nevertheless, in 1837, Porto Rico was deprived of the

right of representation in the Spanish Cortes, which she had had since 1808, as a result of the advent of Ferdinand VII. to the throne. During half a century the captains-general as a rule favored a systematic demoralization of the common people. 'While they dance and gamble, they will not conspire,' said one of these pernicious governors. Another means by which the government encouraged the demoralization was by promoting and giving good offices to those of the natives who would be traitors to their country by denouncing imaginary conspiracies and revolutions. But one fact about this little people is that, while they feel proud of their Spanish ancestry, yet neither money nor threats could ever win an intellectual Porto Rican to serve the cause of tyranny. On Sept. 20, 1868, the 'insurrection of Lares' broke out—an insignificant rising, quickly suppressed. The plan was to follow Cuba, which island was then struggling to throw off the Spanish yoke. Dr. Betances, the leader of this movement, escaped to the neighboring island, and then went to live in exile in Paris, where he died some 30 years later, never forgetting his little island, and never forgotten by those whom he once dreamed he could free. As one result of the revolution of that year in Spain and the subsequent establishment of the republic, Porto Rico was again permitted to send representation to the Cortes. On March 22, 1873, the slaves in Porto Rico were manumitted, 31,000 receiving freedom in a single day. The slaveholders were paid in government bonds, which a foreign syndicate bought up at 15 per cent. Then followed a period of political unrest with the restoration of the monarchy, marked by abuses of all kinds committed by the officials sent by Spain. By this time, 1873-4, political parties were organized following the line of the Cuban reform party and later (1886) the Home Rule party. This movement on the part of the Porto Rican patriots brought about in 1887, under General Palacios, what is called the 'Componte' era, when the people were tortured by the mounted police (*Guardia Civil*), and the most honorable citizens were thrown into the dungeons of 'El Morro' and barely escaped being shot. This is perhaps one of the darkest periods of the colonial history of the island. By the end of 1896 the Porto Ricans again began to feel the influence of the Cuban ideas, and the western part of the island showed a disposition to revolt, and might have done so if some one of the Porto Ricans who had gained honor and renown in the Cuban war had landed to lead them. But as a rule the Porto Ricans are a peace-loving people; they at all times preferred to gain what liberties they could bargain from Spain by means of the press and other means of propaganda, rather than resort to arms. It was about this time that some prominent citizens from Camuy were imprisoned and tortured, and everything indicated that the horrible scenes under General Palacios

were to be once more repeated under General Sabás Marín. It was now however too late for this, for although the Spaniards never doubted that they would ultimately come out victoriously from a conflict with the United States, nevertheless a little apprehension as to the future made them more humane and cautious in their treatment of defenseless Porto Ricans. On Nov. 25, 1897, the royal decree conceding automony to Porto Rico was signed.

After 400 years of a military government of a most absolute character, Porto Rico finally secured what is called an autonomic constitution, which gave the island a parliament consisting of a senate of 15 members, 8 of whom were elected by the people and 7 appointed by the crown; and a lower house, consisting of 1 representative for every 25,000 inhabitants. The system also provided for a body of 5 minsters,—minister of justice and state (Gracia, Justicia, y Gobernacion), of finance, of education, public works and roads, and of agriculture, industry, and commerce,—appointed by the governor, thus practically providing for the separation of the three powers. The power of veto was retained by the government at Madrid. It has been asserted by the natives that this measure of home rule fully satisfied their ambition. Notwithstanding it has often been set up against this law that it was not in good faith, and was not to stay, being only a measure of war and a trick of Spain to induce the Cubans to lay down their arms. It is probable that the law was so intended; those, however, who so speculate seem to forget that colonizing nations never granted any degree of liberty to their colonies, except they were compelled to by the force of circumstances; but no one will question the fact that once Spain had granted to her colonies in America a liberal form of government, she could never have been able to restore on this side of the ocean her 16th century régime. This self-government however was of short duration, for a few months after the elections, April 21, 1898, Governor-General Macias suspended the constitutional guarantees and declared the island in a state of war. On that day war began between the United States and Spain, though not formally declared until the 25th. On May 12, 1898, the capital was bombarded by Admiral Sampson, only a few buildings being damaged and probably a dozen casualties. On July 25, 1898, American forces occupied Guanica; three days later Ponce; on Aug. 10 skirmishes took place at Hormigueros and Guamani, on the w. and s.e. parts of the island, and on Aug. 12 at Las Marias, on the w., and near the Asomante, on the Ponce road. On Aug. 12, 1898, the protocol was signed providing for the cession of Porto Rico, etc., to the United States; Oct. 18, 1898, the last of the Spanish troops to sail embarked for the peninsula; the forces of the United States occupied San Juan, Maj.-Gen. John R.

Brooke taking up the duties of military governor. His successors in that office were: on Dec. 6, 1898, Maj.-Gen. Guy V. Henry, and May 18, 1899, Brig.-Gen. George W. Davis. This government is noted in the history of Porto Rico for its mildness and wisdom. On Aug. 8, 1899, a hurricane, accompanied by excessive rainfall, devastated the island, 3,369 persons being killed outright, while thousands died from starvation. The army distributed 32,000,000 rations to the sufferers. Disasters of this nature have befallen Porto Rico, although probably never so severe, more than 20 times since the year 1515, occurring most commonly in July, August, and September. On April 12, 1900, an act of Congress required that there should be established for Porto Rico a modified territorial form of government, consisting of executive, legislative, and judicial branches. For the benefit of such government a tariff of 15 per cent was imposed on imports from the United States into Porto Rico, and *vice versa*. On May 1, 1900, civil government was inaugurated, having the following general features: Governor, appointed by the President of the United States; Legislative Assembly, consisting of an Executive Council or Senate appointed by the President (six Americans and five Porto Ricans), and a House of Delegates (35 members elected by the people); judiciary, including supreme and United States district courts. The first governor was Hon. Charles H. Allen; his successor, Sept. 15, 1901, Hon. William H. Hunt. On July 25, 1901, the President proclaimed cessation of tariff duties between Porto Rico and the United States. On Dec. 2, 1901, the Supreme Court of the United States decided that Porto Ricans are not *ipso facto* citizens of the United States. In Dec., 1902, the insular treasury had on hand a considerable balance from revenues produced by the system of local taxation enacted by the Legislative Assembly. On July 4, 1904, Beekman Winthrop took the oath of office as governor of Porto Rico, and on April 18, 1907, was succeeded by Regis H. Post. George R. Colton is the present governor (1911).

There are two political parties in Porto Rico, both working to change the status of the island; one, which is called the Republican party, with a marked tendency for Americanization, wants the island to become a state of the Union, and the other, a Unionist party, with a platform advocating either home-rule under a colonial government, statehood, or independence. In one point both parties agree, and that is that the upper house, which is now appointive, should be elective.

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Cuba and Porto Rico; van Middeldyk, *The History of Puerto Rico.*

PORTO SANTO, *pōr'tō sân'tō:* second in size and importance of the Madeira Islands, about 420 m. w. of Morocco, 25 m. n.e. of the island of Madeira. It is 6 to 8 m. in length, 2 to 3 in breadth, and not more than 500 ft. above sea-level, though the surface is rugged and hilly. It is of volcanic origin, and almost destitute of trees. The soil is poor: the only productions are maize, barley, vegetables, a few fruits, and a poor kind of wine. Its capital, Porto Santo, on a handsome bay with a good harbor, protected by a battery, is frequented by vessels going to and from the Cape of Good Hope. Pop. of island about 1,600.

PORT PHIL'LIP: bay in Australia. See MELBOURNE.

PORTRAIT, n. *pōr'trāt* [F. *portrait,* a portrait—from *portraire,* to draw, to delineate; mid. L. *protrahĕrĕ,* to paint—from L. *pro,* forward; *trahĕrĕ,* to draw forth or drag]: the representation of a person's face, with a part or the whole of the body, in water or oil colors, or traced with a pencil or crayon, and taken from life; any vivid representation in words, as of a person. PORTRAITURE, n. *pōr'trātūr,* formerly, a portrait; the art or practice of drawing portraits, or of vividly describing persons in words. PORTRAY, v. *pōr-trā',* to paint or draw the resemblance of anything; to describe vividly in words; in *OE.,* to adorn with pictures. PORTRAY'ING, imp. PORTRAYED', pp. *-trād.* PORTRAY'ER, n. *-trā'ẽr,* one who paints or draws to the life. PORTRAY'AL, n. *-ăl,* the act of portraying. POR'TRAITIST, n. *-trāt-ĭst,* one who paints portraits, or produces them by photography. PORTRAIT-PAINTER, one whose occupation or profession is to paint portraits.

PORTREE'. See SKYE.

PORTREEVE, n. *pōrt'rēv,* or PORT'GREVE, n. *-grēv* [AS. *port,* a harbor; *gerefa,* a count or earl: L. *portus,* a harbor]: principal magistrate in a port or maritime town. This was the early name of the mayor in London and elsewhere.

PORT REPUBLIC, BATTLE OF: Gen. Stonewall Jackson defeated Gen. Banks at Winchester May 25, 1862, drove him across the Potomac, and then retreated up the Shenandoah Valley, slipping between the converging forces of Gens. Frémont and McDowell near Strasburg on the 31st. Frémont pursued by the Valley road, and Gen. Shields, commanding a division of McDowell's corps, endeavored to fall upon his flank and intercept him by moving up the Luray Valley. On the evening of June 1, Shields moved out of Front Royal, Col. S. S. Carroll leading, with some cavalry, infantry, and four guns, to destroy the bridges over which Jackson might retreat to Stanardsville. But Jackson himself had destroyed the bridges by which his flank could be reached, and Shields

halted his advance brigades at Conrad's Store and Columbia Bridge. On hearing that Jackson had passed through Harrisonburg in the direction of Port Republic, and that Frémont had reached Harrisonburg in close pursuit, Shields ordered Carroll's and Tyler's brigades forward to head off Jackson while Frémont pressed his rear. The orders to the two brigade commanders were to guard the river at Port Republic and cut the railroad at Waynesboro. Shields, with two brigades, remained at Luray to watch Longstreet, who was incorrectly reported moving into Luray Valley, by the gaps of the Blue Ridge, with 10,000 men. Carroll, with less than 1,000 infantry, 150 cavalry, and Clark's regular battery of six guns, marched from Conrad's Store on the afternoon of June 7 and halted in the night six miles from Port Republic, where his scouts brought information that Jackson's train was packed near the place, guarded by about 300 cavalry. Carroll, with his 150 cavalry and four guns, leaving his infantry to follow, started very early in the morning of the 8th, drove in the Confederate outposts and put two guns in position commanding both ends of the bridge over the South Fork of the Shenandoah river, and ordered the cavalry to charge and seize the bridge. The charge was made and the bridge seized, Jackson, whose headquarters were in the village, narrowly escaping across it, while some of his staff were captured. Carroll, with two guns, followed his cavalry to the bridge; some of the cavalry entered the village and attacked the wagon-train. By some misunderstanding the bridge was not burned as Shields says it was intended to be, and Jackson, the moment he crossed it, ordered batteries in position which opened on Carroll, and a regiment of infantry rushed down and over the bridge, driving him away and capturing one of his guns. Carroll retreated two miles down the river, with a loss of 39 men killed and wounded, the greater part of which was in the 7th Indiana, which came under artillery fire as it was moving to the support of the cavalry. Jackson moved Taliaferro's brigade into the village to hold the fords of South river, a branch of the South Fork of the Shenandoah, and placed Winder's brigade on the north side of the latter to observe Carroll and by artillery check any renewed advance. While all this was transpiring the battle of Cross Keys was going on, and Jackson, hearing the sounds of the engagement, rode to the field. At 2 p.m. Tyler came up with his brigade and joined Carroll, and as senior officer assumed command. He had about 3,000 men and 16 guns, and took position with his right on the South Fork of the Shenandoah and his left on commanding ground, on which was disposed the greater part of the artillery. Jackson, who had repulsed Frémont at Cross Keys, on the 8th, returned to Port Republic during the night, leaving Ewell, with a small force, to confront Frémont, and early in the morning of

the 9th led Winder's brigade across the bridge and attacked Tyler's right, with the intention of turning it, but was repulsed. Winder, rallying a part of his brigade and reinforced by a regiment of Taylor's Louisiana brigade, made another effort and was again repulsed, with the loss of one of his guns and many men. Meanwhile some of Ewell's troops from Cross Keys came on the field and Taylor's Louisiana brigade was ordered to turn Tyler's left and take his guns. Taylor moved under cover of dense woods to a position on the flank of Clark's battery of six guns, from which support had been withdrawn, and charged it; but Clark, turning his guns upon him, repulsed him with shell and canister. The attempt was renewed on that flank, but Tyler's infantry was now supporting the guns, and the contest around and among them, at close quarters, was severe, but the Confederates were held in check. The fight had now raged more than four hours, Jackson had withdrawn all his forces from Frémont's front, crossed the bridge and destroyed it, and concentrated against Tyler, who saw that the time had come to retreat, and gave the order, Carroll having charge of the movement. The artillery and infantry on the right were withdrawn in good order, but on the left so many horses had been killed or disabled that but one gun was saved, the Confederates advancing and seizing five, as Tyler's men began the retreat, and turning them upon the retiring troops, throwing the rear of the column into some disorder. The Confederate infantry followed four miles, the cavalry until Shields came up with the rest of his division, when pursuit was checked and Shields continued the retreat to Conrad's Store. After the retreat Frémont appeared on the opposite side of the river, which he could not cross, and opened upon Jackson with his artillery. During the morning Jackson had put his trains in motion for Brown's Gap of the Blue Ridge, and after the battle he followed them. The Union loss was 67 killed, 393 wounded, and 558 missing; the Confederate loss, 816 killed, wounded, and missing.

PORT ROYAL: S. C., village in Beaufort county; at the southern end of Port Royal island, on the Port Royal & Augusta railroad; 53 miles southwest of Charleston. Near here, a French Huguenot colony was established in 1664 by Ribault, which was taken by the Spaniards in 1665 and all the garrison killed. On Feb. 3, 1779, during the southern campaign of the Revolution, Maj. Gardiner, with 200 British soldiers, attempted to seize Port Royal island, but was attacked and defeated by Gen. Moultrie with about the same number of men, the British loss being serious, that of the Americans slight. In the civil war the harbor of Port Royal was the scene of a severe battle. (See PORT ROYAL BAY, BATTLE OF.) Port Royal has an excellent harbor, and a large drydock, and has been the rendezvous of the North Atlantic squadron. Pop. (1900) 601. Consult: Parkman, *Pioneers of France*

in the New World, for an account of the Huguenot colony.

PORT ROYAL BAY, Battle of: as early as June, 1861, the United States authorities, in order more effectually to maintain the blockade and to secure a military and naval base of operations on the southern Atlantic coast, determined to seize Port Royal bay, one of the finest harbors on the coast, 56 miles south of Charleston and 25 north of Savannah. A fleet of 16 war vessels and nearly 40 transports, under Capt. S. F. Dupont, carrying 12,000 men with supplies, under Gen. T. W. Sherman, sailed from Hampton Roads on the morning of October 29, and by November 6 had assembled off the entrance to Port Royal bay, the gunboats, proceeding, having driven into the harbor three Confederate vessels that had run out and opened fire upon them. The bay was defended by two earthworks and some shore-batteries, one earthwork on each side of the entrance, Fort Walker, on Hilton Head, the south side, and Fort Beauregard, on Bay Point, St. Phillips Island, on the north. These were strong and well-constructed works, mounting 42 heavy guns, 22 of which were in Fort Walker, and garrisoned by nearly 3,000 men, under Gen. T. F. Drayton. The distance between the two works was $2\frac{1}{2}$ miles. In addition to the land-works, there were three small Confederate gunboats in the bay, under command of Com. Josiah Tatnall. The fleet was divided into two columns of nine and five vessels. At 9 a.m. November 7 the fleet crossed the bar and advanced in a long well-ordered column to the attack, while the transports lay at anchor outside ready to land troops. Capt. Dupont led the *Wabash* up the middle of the bay, receiving the first fire from both forts at 9:26 a.m., and replying to both, until two miles beyond them; then he turned to the left in a wide circle and led back past Fort Walker at 800 yards distance, opening upon it broadside after broadside. The rest of the column followed. At the same time the flanking column of five gunboats steamed up the bay, nearer to Bay Point, and poured broadsides into Fort Beauregard and then, steering to the other side, advanced against Tatnall's fleet, driving it into Scull creek and, taking position near the shore and flanking Fort Walker, opened upon it a destructive fire, to which it could not respond, as the one gun on that flank of the fort had been shattered by a round shot. After the main column had passed down the bay about two miles, it turned, at 11 a.m., and again passed in front of Fort Walker, at 300 yards closer range than before, and with a more terrific fire, part of which was against Fort Beauregard. As the maneuver was repeated for the third time it was discovered that the Confederates were abandoning Fort Walker; its guns were silenced; a few shots were fired, to which there was no response; a small party was sent ashore, the Confederate flag hauled down, and the Union

flag run up at 2:20 p.m. Before the close of the action the *Pocahontas*, Commander Percival Drayton, which had been delayed by injuries received in the storm, entered the bay and opened fire on the fort. Commander Drayton was a brother of the commanding officer of the Confederate forces. The Confederates had left in haste, leaving tents standing, and escaped across Scull creek, being assisted by the boats of Tatnall's fleet. By nightfall the transports had come into the bay and landed Gen. H. G. Wright's brigade at Hilton Head. Fort Beauregard was abandoned about 5 p.m., after its commanding officer had spiked the guns and destroyed the greater part of the powder. It was occupied next morning by Gen. Stevens' brigade. The Union loss was 8 killed and 23 wounded; the Confederate loss, 11 killed, 48 wounded, and 7 missing.

PORT ROYAL-DES-CHAMPS, *pōr rwâ-yâl'-dā-shâng;* often abbreviated to PORT ROYAL: convent of Cistercian nuns, near Versailles, which obtained much celebrity during the 17th century. It was founded for nuns by a member of the family of Montmorenci, in the early part of the 13th century; and soon after its establishment, obtained from the pope the privilege of receiving lay persons, who, without taking monastic vows, desired to live in religious retirement. This portion of the Port Royal institute in later times became of great importance. The discipline of the convent having been much relaxed in the 15th and 16th centuries, one of its worst abuses—that of appointing the superior, not on account of fitness, but from considerations of family or other worldly or political motives—became in the end the occasion of its complete reformation. Angelique Arnauld, sister of the celebrated brothers Arnauld, was appointed, when a mere child, coadjutrix of the abbess; and on the death of the abbess, though then in only her 11th year, Angelique succeeded to the office. As Mère Angelique advanced in years, she felt moved, though still very young, by a profound sense of her responsibilities; and undertook a complete and rigid reformation of the community, which she carried out in all its details—e.g., strict observance of religious poverty, abstinence from meat, complete seclusion, and the most severe ascetic exercises. The community was removed to Paris 1626, and 1633 to a new convent thenceforward called Port Royal-de-Paris; and from this time the old establishment of Port Royal-des-Champs was exclusively devoted to the use of a lay community, in accordance with the original papal privilege. This community quickly became famous, numbering among its inmates some of the most distinguished scholars of that age, Antony Arnauld, Le Maistre, Antony and Louis Isaac le Maistre de Sacy, Nicole, Lancelot, Sericourt, and several others. Their rule of life was most austere, rising at 3 a.m., devoting many hours to prayer and spiritual reading and instruction,

and a portion of the day to manual labor. One of their most important public services was the establishment of a school, for which they prepared the well-known educational books known under the name of Port Royal, the Greek and Latin Grammars, General Grammar, Geometry, Art of Thinking, etc. This school was for a time transferred to Paris, a portion of the nuns being sent back to Port Royal-des-Champs; but eventually it was established at an out-farm of the latter place, called Les Granges.

Port Royal, however, is even more known in history through its relations with the Jansenist controversy. For the nature and origin of these relations, see JANSEN. It remains to relate the later fortunes of Port Royal and its members, as affected by the proceedings of the authorities civil or ecclesiastical. The nuns of Port Royal, having refused to subscribe the formulary condemning the Five Propositions, a royal order was issued 1660 for suppression of the school, and removal of the borders of Port Royal-des-Champs; and at length the abbess, and several other nuns, were arrested, and confined as prisoners in other monasteries. After the 'Peace of Clement IX.' they were permitted to return; but the two communities, Port Royal-des-Champs and Port Royal-de-Paris, were placed under separate government. This led to many disputes, and to a perpetuation in Port Royal-des-Champs of the Jansenist spirit and tenets; and when the final steps for the repression of that party were taken about 1707, a formal bull was issued by Pope Clement XI. for suppression of that convent, and transfer of its property to Port Royal-de-Paris. The nuns, accordingly, were finally dispersed and distributed over convents of different orders throughout France. The property of the convent and church were transferred to the Paris house, and all the buildings of Port Royal-des-Champs were levelled to the ground, by order of the king. See Sainte-Beuve's exhaustive history, *Port Royal* (4th ed. 6 vols. 1878).

PORT ROYAL LOGIC: a treatise published in 1662 anonymously by Arnauld and Nicole, members of the Port Royal community. It sets forth the Cartesian logic and commanded wide patronage and popularity. It has been translated several times into English.

PORT SAID, *sâ-ēd'*: sea-port at the Mediterranean end of the Suez canal, Egypt, and capital city of the Egyptian department of the isthmus. It lies in the easternmost part of an island between the Mediterranean and Lake Menzaleh, about 110 m. n.n.e. of Cairo. It was not founded until the canal was partly built. Hence its architecture is European, and many of the houses are wooden with sloped roofs. A fountain and statue of Queen Victoria was built in 1898, and a colossal statue of De Lesseps, by Frémiet, stands at the entrance of the canal. Pop. 43,000.

PORT SAID′: see SUEZ CANAL.

PORTSEA ISLAND, *pōrt'sē:* small island on the s. coast of Hampshire, England; having on its w. side Portsmouth Harbor, on its s.e. side Langston Harbor, on its e. side Chichester Harbor, and separated from the mainland on the n. by a narrow channel, crossed by several bridges. It is four m. long, two to three m. broad, and contains the important towns of Portsea and Portsmouth (q.v.).

PORTSMOUTH, *pōrts'mŭth:* city, port of entry, cap. of Rockingham co., N. H.; on the Piscataqua river and the Boston and Maine railroad; 3 m. from the Atlantic Ocean, 54 m. n.e. of Boston; only seaport in N. H. It is on a peninsula formed by the river; has a capacious, deep and accessible harbor, and is defended by earthworks on Gerrish Island and Jerry's Point and Forts Constitution and McClary in the harbor. The manufacturing establishments are important; they include breweries, boot and shoe factories, cotton mills and marble works; shipbuilding was formerly an important industry, and small vessels are still built. It is a quiet city and old-fashioned in appearance, containing many colonial houses of historic interest; chief among these are the Wentworth house and the Langdon house. Other buildings of note are the Saint John's Church, the Federal custom-house and the Athenæum. The latter has a library of about 25,000 volumes, and there is also a public library of over 16,000 volumes. The city contains a Home for Indigent Women, a Home for Children and other charitable institutions. The navy yard, which is officially known as the Portsmouth navy yard, is situated on an island of the Piscataqua (formerly known as Fernald's Island), within the limits of the township of Kittery, Maine.

It was first settled in 1623 by a company under the direction of Fernando Gorges, and was under the jurisdiction of Massachusetts until 1679, when New Hampshire became a separate colony. It was incorporated as a town in 1653, when it received the name of Portsmouth, and became a city in 1849. It was the capital of the State for some time, and is now alternately with Concord the seat of the sessions of the United States district court of New Hampshire. In 1898, the Spanish prisoners from Cervera's fleet were brought here and given comfortable quarters on a small island connected with the navy yard island. The Treaty of Portsmouth (q.v.) was signed here 1905, Sept. 5.

The city government is vested in a mayor, who holds office for a year, and a legislative council with two branches. The police commissioners are appointed by the State. The waterworks are under municipal management. Pop. (1900) 10,637; (1910) 11,269.

PORTSMOUTH.

PORTSMOUTH, Ohio, city, county-seat of Scioto county; at the confluence of the Scioto and Ohio rivers, at the southern terminus of the Ohio Canal, and on the Chesapeake & O., the Baltimore, O. & S., and the Norfolk & W. R.R.'s; about 80 miles s. of Columbus and 95 miles e. by s. of Cincinnati. It has steamboat connection with all the Ohio River ports. It was settled in 1803 and in 1814 was incorporated. It is in an agricultural region, and in the vicinity are valuable deposits of fire-clay. The chief manufactures of the city are foundry and machine-shop products, paving and building brick, fire-brick, cars, lumber products, stoves, ranges, beer, rectified spirits, paper boxes, wagons, carriages, furniture, veneer factory products, and boots and shoes. In 1901 the invested capital in manufacturing plants was nearly $5,000,000; and the value of the products for the same year was about $8,000,000. The principal public buildings are the Government building, county court-house, municipal building, some of the business blocks, the church and educational buildings. It has a city hospital, homes for old ladies, and orphanages. The educational institutions are the public and parish schools, several private schools, a public library, and the Hamilton Peebles Reading Room.

The government is vested in a mayor, who holds office two years, and a council. The administrative officials who are chosen by popular vote are the members of the school board, the justices of the peace, the board of public service, the assessors, city treasurer, city solicitor, and city auditor. The city owns and operates the electric light plant and the waterworks. Pop. (1910) 23,481.

PORTSMOUTH, Va.: city, county-seat of Norfolk County; on the Elizabeth river, and on the Atlantic Coast Line, the Seaboard Air Line, and the Southern R.R.'s; opposite Norfolk, with which it is connected by ferry. It was settled in 1752 and in 1858 was chartered as a city. There is a steamer line to Baltimore, and regular steamer connections with the chief Atlantic coast cities. The city is better known for its commercial interests than for its manufacturing industries; but it has a number of industrial establishments, chief of which are railroad shops, cotton mills, storage-plants, and lumber yards. It exports large quantities of lumber, cotton and cotton products, naval stores, pig-iron, fruits, and vegetables. It has a United States navy yard, which has a plant for constructing steel ships, and two dry docks. It has also a United States Navy Hospital. The first building on the present site was erected in 1762. The government is administered under a revised charter of 1893, which provides for a mayor, who holds office four years, and a council. Pop. (1910) 33,190.

PORTS'MOUTH: important seaport, market-town, and municipal and parliamentary borough, containing

the chief naval arsenal of Great Britain; in s. Hampshire, on the s.w. shore of Portsea Island (q.v.), at the entrance to Portsmouth Harbor, opposite the town of Gosport, with which it communicates by a steam-bridge. It is 74 m. s.w. of London by the London and Southwestern railway. The county borough comprises Portsmouth proper, Portsea, and several suburbs, these being now more extensive than the towns to which they belong. Both towns, united so as to form a fortress, are protected by one of the most extensive modern systems of fortifications, which have replaced the former moats, walls, and ramparts, entered by four gates, one of them designed by Inigo Jones. The suburbs consist of Landport and Kingston adjacent to Portsea on the north, and of Southsea, on the east side of the town of Portsmouth. The two first named districts are for the most part occupied by artisans connected with the royal naval dockyard in Portsea. A fine park, the Victoria, is in a conveniently central situation. Southsea is one of the favorite English seaside resorts. Its situation commands fine views of the anchorage at Spithead, and of the Isle of Wight. Southsea common, which extends down to the beach, forms a fine public recreation ground, and on it troops from the neighboring garrisons are often assembled for field days and reviews. Southsea Castle with its adjacent earthworks, the batteries of the Gosport side, and the circular forts in the roadstead, command the entrance to Portsmouth Harbor. The town of Gosport on the opposite side of the harbor entrance is connected with Portsmouth by a floating bridge ferry.

The best street in Portsmouth is the High street, which divides the town into two nearly equal parts, and contains the principal shops, hotels, and places of business. The prominent public buildings include Government House, the splendid new town-hall opened in 1890; the postoffice, the Grammar School, Athenæum, theatre, hospital, Sailors' Home, Central Railway Station; the parish church (St. Thomas à Becket's), built about 1170; the Roman Catholic Cathedral with schools adjacent; the Presbyterian Church; the Independent Chapel in King street; and numerous other places of worship.

The royal dockyard, which has recently been extended by the addition of new docks and basins, covers an area of about 500 acres. It is enclosed by a wall 14 feet high, and entered by a lofty gateway. It includes vast storehouses, machine-shops, extensive slips and docks, ranges of handsome residences for the port-admiral and other officials, etc. Outside the dockyard an area of 14 acres contains the gun-wharf.

Portsmouth has no important manufactures except those connected with its naval establishments, and a few large breweries. Its trade, both coasting and foreign, is of considerable extent; the former consisting chiefly of

coals from the Welsh and Newcastle coal fields, cattle and sheep from the Isle of Wight and the west of England, and large quantities of corn and provisions from Ireland; and the latter of wine from different parts of the continent, eggs from France, and timber from the Baltic.

Portsmouth is mentioned in the Saxon Chronicle as existing in 501. It appears to have taken the place of Porchester, which as *Portus Magnus* had been selected by the Romans for a naval station, but became unfit for that purpose in consequence of the silting of the harbor. During the reign of Alfred a fleet of nine ships fitted at the port defeated the Danes, who had long infested the coast; and immediately before the Conquest a large fleet was fitted out here to intercept the Norman armament. About 1256 Henry III. assembled an army here for the invasion of France. In 1377 Portsmouth was attacked by the French, who succeeded in burning a part of the town. The town was taken by the Parliamentarians in 1642. Pop. (1901) 189,160.

PORTSMOUTH, TREATY OF: the peace treaty, which ended the Russo-Japanese War (q.v), signed 1905, Sept. 5, at Portsmouth, N. H., by Baron Komura and Minister Takahira representing Japan, and Count Serge Witte and Baron Rosen representing Russia. The treaty embodied 15 articles and 2 annexes, of which the following is a synopsis:

Article I stipulated for the re-establishment of peace and friendship between the sovereigns of the two empires and between the subjects of Russia and Japan.

Article II.—Russia recognized the preponderant interest from political, military, and economical points of view of Japan in the Empire of Korea and stipulated not to oppose any measures for its government, protection, or control. Russian subjects and Russian enterprises to enjoy the same status as the subjects and enterprises of other countries.

Article III mutually agreed that the territory of Manchuria be simultaneously evacuated by both Russian and Japanese troops. All rights acquired by private persons and companies to remain intact.

Article IV.—The rights possessed by Russia in conformity with the lease by Russia of Port Arthur and Dalny, together with the lands and waters adjacent to be passed over in their entirety to Japan, but the properties and rights of Russian subjects to be safeguarded and respected.

Article V.—Russia and Japan engaged not to put any obstacle in the way of the general measures, alike for all nations, that China might take for the development of the commerce and industry of Manchuria.

Article VI.— The Manchurian Railway to be operated jointly between Russia and Japan at Kwang-cheng-Tse. The two branch lines to be employed only for commercial and industrial purposes. In view of Russia keeping her branch line with all the rights acquired by convention with China for the construction of that railway, Japan acquired the mines in connection with the branch line which falls to her. The rights of private parties or private enterprises to be respected. Both parties to the treaty remain absolutely free to undertake what they deem fit on expropriated ground.

Article VII.— Russia and Japan engaged themselves to make a conjunction of the two branch lines which they own at Kwang-cheng-Tse.

Article VIII.— Agreed that the branch lines of the Manchurian Railway be worked with a view to assure commercial traffic between them without obstruction.

Article IX ceded to Japan the southern part of Saghalin Island as far north as the fiftieth degree of north latitude, together with the islands depending thereon and assured right of free navigation in the Straits of La Perouse and Tartary.

Article X recited the situation of Russian subjects on the southern part of Saghalin Island and stipulated that Russian colonists there shall be free and shall have the right to remain without changing their nationality. The Japanese Government, however, to have the right to force Russian convicts to leave the territory which is ceded to her.

Article XI.— Russia engaged to give Japanese subjects the right to fish in Russian territorial waters of the Sea of Japan, the Sea of Okhotsk, and Bering Sea.

Article XII.— Renewed the commercial treaty existing between the two Governments prior to the war in all its vigor, with slight modifications in details and with a most-favored nation clause.

Article XIII.— Reciprocally engaged to restore prisoners of war on the payment of the real cost of keeping the same, such claims for cost to be supported by documents.

Article XIV.— The peace treaty to be drawn up in two languages, French and English, the French text being evidence for the Russians, and the English text for the Japanese. In case of difficulty of interpretation the French document to be final evidence.

Article XV.— The ratification of the treaty to be countersigned by the sovereigns of the two States within fifty days after its signature. The French and American Embassies to be intermediaries between the Japanese and Russian Governments to announce by telegraph the ratification of the treaty.

The following two additional articles were also agreed to:

Article I.— The evacuation of Manchuria by both armies to be completed within 18 months from the sign-

ing of the treaty, beginning with the retirement of troops of the first line. At the expiration of the 18 months the two parties only to leave as guards for the railway fifteen soldiers per kilometer.

Article II.—The boundary which limits the parts owned respectively by Russia and Japan in Saghalin Island to be definitely marked off locally by a special limitographic commission.

PORT TALBOT: see ABERAVON.

PORT TAM'PA CITY, Fla., town, Hillsboro c.; on Tampa Bay, and on the Atlantic Coast Line railroad; 8 m. s. of Tampa. It was founded in 1889, and incorporated in 1891. It is the port of Tampa (q.v.). It is in a fruit-growing and agricultural region. Pop. (1900) 1,367; (1910) 1,343.

PORT TOWNS'END: city, cap. of Jefferson co., Wash.; on Port Townsend Bay, at the entrance to Puget Sound (q.v.), and on the Northern Pacific and the Port Townsend Southern R. R.'s; about 70 m. n. of Olympia. It has steamer connection with San Francisco, Alaska, and many of the principal ports on the eastern coast of Asia. The harbor ranks with the largest in the world. The place was settled in 1851, and in 1860 was incorporated as a city. Fort Townsend is on the west side of the bay, five miles by land and two and one-half miles by water from the city, and other government fortifications will be on Admiralty Head, Point Hudson, Point Partridge, and Marrowstone Point. The government has established a marine-hospital and a quarantine station. Port Townsend, as the port of entry for the Puget Sound district, had, in 1902, an export trade of $34,726,000, and an import trade of $12,752,000.

The city is in an agricultural and lumbering region. In the vicinity are deposits of oil and valuable minerals. The chief industrial establishments are lumber and planing mills, a shipyard, machine shops, bottling works, steam boiler works, herring pickling and curing works, salmon and sardine canneries, grain elevators, and flour mills. The chief exports are grain, lumber, fish, oil, live stock, farm and dairy products, and pig iron. The pig iron is from the Irondale furnaces. The principal public buildings are the Government Custom House, city hall, court-house, United States Marine Hospital, the quarantine station, a sanatorium, and Saint John's Hospital. The educational institutions are a high school, public elementary schools, private business schools, and a public library. The scenery around Port Townsend is beautiful, surrounded as it is by water and mountains. The government is administered under a charter of 1890, which provides for a mayor who holds office one year, and a council. The administrative officials are appointed by the mayor or elected by the council. Pop. 3,500.

PORTUGAL, *pōr'tū-gal*, Port. *pōr-tô-gâl':* most westerly kingdom in Europe, part of the great Spanish peninsula; 36° 55′—42° 8′ n. lat., 6° 15′—9° 30′ w. long.; greatest length north to south is 368 miles, average breadth east to west about 100 miles. The table shows area and pop. 1900 of the seven old provinces, with the corresponding official districts:

Provinces and Districts.	Sq. miles.	Pop. 1900.
Minho (Viana, Braga, Porto)	2,807	1,173,106
Tras os Montes (Braganza, Villa-Real)	4,293	429,170
Beira Alta (Aveiro, Coimbra, Viseu)	4,544	1,038,485
Beira Baixa (Guarda, Castello Branco)	4,704	479,921
Estremadura (Leiria, Santarem Lisboa)	6,876	1,232,593
Alemtejo (Portalegre, Evora, Beja)	9,431	413,531
Algarve (Faro)	1,873	254,851
Total	34,528	5,021,657

Islands reckoned officially as belonging to the home territories are the Azores (q.v.), 920 sq.m., pop. 256,474, and Madeira (q.v.), etc., 505 sq.m., pop. 150,528.

The following shows the colonial possessions:

	Colonies.	Sq. miles.	Pop.
1.	AFRICAN—		
	Angola	484,800	4,119,000
	Cabinda	460	.....
	Cape Verde Islands	1,480	147,424
	Guinea and Bissagos	4,440	820,000
	Madeira	505	150,528
	East Africa	301,000	3,120,000
	Prince and St. Thomas Islands	360	42,103
2.	ASIATIC—		
	Goa, Damao, Diu, etc	1,558	572,290
	Macoa	4	78,627
	Timor	7,458	300,000
	Total	802,025	9,349,972

The Portuguese made strenuous efforts to have the mouth of the Congo recognized as theirs; but a conference of the great powers at Berlin, 1884, rejected their claim in favor of the African International Assoc. See AFRICA; CONGO, INDEPENDENT STATE OF.

Physical Aspect, etc.—Portugal is essentially a littoral country, forming the Atlantic on west part of the Spanish peninsula, from which it is separated by political, rather than physical boundaries. Its mountains and rivers are, with few exceptions, mere west prolongations of those of Spain. The principal mountain ranges lie about half-way inland, leaving almost the whole of its 500 miles of coast-line a flat sandy tract, with few rocky headlands; hence there are scarcely any harbors or places of safe anchorage except at the embouchures of the larger rivers. The highest range is the Serra de Estrella, which, passing from north northeast to south southwest through Beira and Estremadura, terminates in the steep acclivities of Cintra and Cap la Rocca, near Lisbon. The principal chain, known also as the Serra da Junto,

merges in a series of ridges, which cover a tract 30 miles in length, between the Tagus and the sea. Another mountain range, named the Serra de Calderao and the Serra de Monchique, a mere continuation of the Spanish Sierra Morena, crosses the southern part of Portugal from east to west and terminates in its most southern promontory of Cape St. Vincent. These ranges, with the numerous mountain-spurs that intersect the northern districts in every direction, so thoroughly occupy the area of Portugal that except along the coast there are only two or three plains of any extent in the whole country, and these are west of the Guadiana, in Alemtejo, and in Beira and Estremadura, near the Tagus and Vonga. The valleys are very numerous, and by their great fruitfulness present striking contrast to the barren and rugged mountains by which they are inclosed. The principal rivers enter Portugal from Spain; the largest are the Guadiana, which, leaving Spain near Badajoz, forms in part the boundary between the southern provinces of the neighboring kingdom; while the Minho and Douro, flowing west, form part of the boundary in the north and northeast. The Tagus, or Tejo, intersects Portugal from its northern frontier to the southern termination of the Estrella Mountains, where it enters the sea a little below Lisbon. The Mondego, the largest river belonging entirely to Portugal, after receiving numerous affluents, falls into the sea about midway between the Douro and the Tagus. The larger rivers, though obstructed at their mouth with dangerous bars, afford admirable means of internal navigation, together with the numerous lesser streams, and might through canals be connected into one great system of water-routes; but hitherto nothing has been done to improve these great natural advantages. Except a few mountain tarns, Portugal has no lakes. It has salt-marshes on the coast, near Setubal in Estremadura, and Aveiro in Beira, where large quantities of salt are annually obtained by evaporation. Mineral springs are abundant in many parts of the country, though hitherto almost wholly neglected.

The vicinity to the west ocean tempers the climate of Portugal, and exempts it from the dry heat by which Spain is visited. The great inequalities of the surface produce, however, great diversities of climate; for while snow falls abundantly on the mountains in the northern provinces, it is never seen in the lowlands of the southern districts, where spring begins with the new year, and harvest is ended by midsummer. Rain falls abundantly, especially on the coast, from October to March; and in general the climate is healthful in the elevated districts even of the southern provinces; but malaria and fever prevail in low flat lands and near the salt marshes. The mean annual temperature at Lisbon is 61° Fahr.

The natural products correspond to the diversity of physical and climatic conditions; for while barley, oats,

and wheat, maize, flax, and hemp, are grown in the more elevated tracts, rice is cultivated in the lowlands, the oak thrives in the north, the chestnut in the central, and the cork, date, and American aloe in the southern parts; while every species of European, and various semi-tropical fruits and vegetables, are grown in different parts of the country. The soil is generally rich; but agriculture is everywhere neglected, and is scarcely made subservient to the wants of the people. The cultivation of the vine and that of the olive are almost the only industries; from the vine is derived the rich red wine familiarly known as Port, from its being shipped at *O Porto*, 'the port.' The mineral products include gold, antimony, lead, copper, marble, slate, coal, iron, and salt; but only the last is worked in sufficient quantity for exportation, and is in eager demand for the British market for its superior hardness which adapts it specially for salting of meat for ships.

The finest cattle are reared in the north; the horses of Alemtejo and the sheep of Beira are most valued. Mules and asses are principal beasts of burden. Goats and pigs are numerous and are raised at very low cost in all the mountain districts. Rearing of bees and silk-worms is being pursued with somewhat increased energy of late years. Fish is abundant in all the rivers and on the coast. The tunny and anchovy fisheries of Algarve are of considerable importance.

Manufactures and Commerce.—Manufactures are still limited, although they have been rapidly increasing of late years, and cotton goods are now exported. Among the articles made to some extent on a wholesale or commercial footing are: textiles at Lisbon; woolen cloth and other woolen stuffs at Portalegre, Covilhão, etc.; porcelain at Vista Alegre; delft and ordinary earthenware at Lisbon, Oporto, Coimbra, Beja, Estremoz, etc.; cottons at Oporto; prints and lace at Lisbon and Oporto; cotton-twist at Thomar; silks at Braganza, Chacim, Oporto, etc.; copper and tin ware at Lisbon and other places; corks, ribbons, embroidery, hats, confectionery, fine soap, jewelry and cut gems, glass, paper, wicker-work, and tobacco. Ship-building is carried on to some extent, vessels being constructed at Lisbon, Figueira, Oporto, and elsewhere. The principal exports besides wine are cork, cattle, cottons, olive-oil, sardines and tunny fish, fruits, iron and copper pyrites, and horses; the principal imports are cereals, colonial produce, woolen, cotton, linen, and silk tissues, iron, steel, and various other metals, machinery, cured fish, coal, petroleum, timber, dyes, and drugs, etc. The imports, chiefly from Great Britain, the United States, Germany, France, Spain, Brazil, and Belgium, aggregated $65,543,000 in 1905, and the exports, to Brazil, Great Britain, Germany, Spain, France, Belgium, and the United States, $31,396,000. In the fiscal year ending June 30, 1908, the United States imported from Portugal,

principally cork and india-rubber, merchandise to the value of $4,967,922, and exported thereto, chiefly wood, manufactured cotton, and illuminating oil, $3,086,082. The exports of wine from Oporto are chiefly to Great Britain, with some to Brazil and Germany. The bulk of imports and exports are raw materials, food substances, and coin and bullion. Portugal has large mineral wealth, but its development is retarded by lack of fuel, principally coal, means of transportation, and modern methods. The principal industries are agriculture, wine-making, and the raising of sheep and goats. About 4,000 vessels are engaged in fisheries, mostly sardine and herring. There are about 1,500 miles of railway in operation, about 500 miles belonging to the state, and all under public subsidy; nearly 3,000 postoffices; and about 400 telegraph offices, with over 11,000 miles of line.

Army and Navy.—The peace strength of the army (fixed annually by the cortes) comprises 24 regiments of infantry, 6 of chasseurs, 10 of cavalry, 3 of mounted artillery, 1 brigade of mounted artillery, 1 regiment and 4 battalions of garrison artillery, and 1 regiment of engineers—total strength, about 33,000 officers and men, colonial force, 9,000 officers and men, besides native troops. The navy comprises 2 second-class protected cruisers; 4 third-class cruisers; 15 torpedo gunboats; 1 torpedo boat; and several coast-guard ships, training ships and transports, manned by about 250 officers and 3,000 men.

Money, Weights, and Measures.—Accounts are kept in reis, milreis, or 1,000 reis, and contos de reis or 1,000,000 reis. The value of the rea is so minute that the milreis is worth only about $1.08. Paper and silver are the chief media of circulation. The French metric system of weights and measures was introduced into Portugal between 1860 and 1863. The Portuguese *libra* was 1.012 pound avoirdupois, the *arroba* was 32 libras, the *quintal* 4 arrobas. The chief linear measures were the *legoa,* or league of 18 to the degree; the *milha,* or common geographical mile; the *braça,* or fathom=7.4 feet; the *vara,* or yard, one-half of the former; and *pe,* or foot=about 13 inches. For dry measure the *moyo*=22 bushels; and for liquids the *almudo*=from 3.7 to 5.6 gallons, were used.

Banking.—Including the savings banks there are 35 banks on the continent, the financial status of which is approximately cash in hand $25,000,000, bills $30,000,000, loans on security $30,000,000, deposits $40,000,000, note circulation $65,000,000. The Ultramarine Bank issues notes for the colonies, but only the notes of the Bank of Portugal circulate in the kingdom. In 1907 the status of the Bank of Portugal was approximately metallic stock $14,000,000, note circulation $74,500,000, deposits and commercial accounts $29,300,000, and loans $26,500,000. The deposits in the State Savings Bank and the

BAY OF BISCAY
ATLANTIC OCEAN
MEDITERRANEAN SEA
Arcachon
Mimizan
Bayonne
Cape Ortegal
Ferrol
Corunna
Castropol
Luarca
Gijon
S. Vincente
Santander
Portugalete
S. Sebastian
Mondonedo
Oviedo
Cape Finisterro
Betanzos
Lugo
Noya
Santiago
CANTABRIAN MTS.
Bilbao
Reynosa
Pontevedra
Villafranca
Orense
Astorga
Leon
Alar
Miranda
Pamplona
Sanguesa
Tafalla
Jaca
Tuy
Minho
Sil
La Baneza
Sahagun
Carrion
Bribiesca
Logrono
Burgos
Caminha
Vianna
Tuleda
Ebro
Exea
Huesca
Barbastro
Mt Perdu
Maladetta
Andorra
Solsona
Vich
Manresa
Gerona
Cape Creux
Rosas
Perpignan
GULF OF LYONS
PYRENEES MOUNTAINS
Pavoa de Varzim
Villa Real
Oporto
Douro
Chaves
Braga
Benavente
Medina
Palencia
Tarazona
Aranda
Soria
Saragossa
Lerida
Iyualada
Barcelona
Tarragona
Vendrell
Reuso
Zamora
Toro
Valladolid
Osma
Almazan
Calatayud
Fraga
Matero
Miranda
Lamego
Ledesma
Salamanca
Sepulveda
GUADARRAMA
Segovia
Siguenza
Molina
Daroca
Montalban
Viseu
Almeida
Avila
El Escoria
Guadalazara
Tarrosa
Aveiro
Guarda
Ciudad Rodrigo
MADRID (59)
Alcala
Tagus River
Albarracin
Coimbra
Castello Branco
Coria
Talavera
Illescas
Cuenca
Teruel
Vinaros
Peniscola
Castellon de la Plana
Leiria
Thomar
Santarem
Caceres
Truxillo
Toledo
Aranjuez
Valverde
Segorbo
Villareal
Murviedro
Valencia
C. Carvoeira
Portalegre
Alcantara
Navahermosa
Quintanar
Madridejos
San Clemente
Requena
Alcazar
Jucar River
Játiva
Gandia
Denia
Cape Nao
Albuquerque
Merida
Don Benito
Villarta
Ciudad Real
Almagro
Albacete
Elvas
Badajoz
Almaden
Yecla
Alcoy
Villajoyosa
Alicante
Setubal
Evora
Cape Espichel
Setubal Bay
Sadas
Beja
Llerena
Segura
Segura R.
Orihuela
Cape Sines
Aljustrel
Mourá
Montoro
Bayen
Murcia
Cordova
Arazena
Mertola
Guadalquivir
Bauza
Huescar
Lorca
Cape Palos
Cartagena
Valverde
Ecija
Granada
Baza
Silves
Ayamonte
Huelva
Seville
Purchena
Aguilas
Lagos
Loule
Jenil R.
Vera
Cape S. Vincent
Moguer
Antequera
SIERRA NEVADA
Moxacar
Tavira
Villa Real
Ronda
Almeria
Algiers
Arcos
Jerez
Malaga
Cape Gata
Tenez
Cadiz
Jimena
Velez Malaga
Motril
Dalias
Algeciras
Gibraltar
Tarifa
Strait of
Ceuta
Tangier
Tetuan
Oran
Melilla
MOROCCO
ALGERIA
BALEARIC ISLANDS
Ciudadela
Palma
Manacor
MAJORCA
IVICA
CABRERA ID.
Ivica
FORMENTERA
PORTUGAL
SPAIN
LISBON (62°)
SPAIN AND PORTUGAL.
SCALE OF STATUTE MILES.
0 50 100 150
Copyright, 1899, by Rand, McNally & Co.
R., MCN & CO., ENGR'S, CHI
40°
35°
10°
5°
0°
5°

Monte Rio Geral amount to about $20,000,000; the monthly deposits in the banks of Lisbon and Oporto averaged during the year about $25,000,000.

Finances.—For the year 1905-6 the revenues, including the colonies, were $72,229,000 and the expenditures $73,338,000. The debt was $864,701,627 in 1906.

Shipping and Navigation.—The mercantile shipping of the kingdom comprise 238 sailing vessels with an aggregate of 56,588 tons, and 44 steamers of 29,443 tons. The average annual movement of vessels from the ports of Portugal is as follows: 6,500 vessels of about 11,000,000 tons enter and 6,525 vessels of 11,000,000 tons clear.

Colonies.—The colonial possessions of Portugal consist of—in Asia—Goa, Damão, and Diu, all in India, Macao, and possessions in the Indian Archipelago, having together an area estimated at 9,000 sq.m., and a population estimated at 950,000; in Africa—Cape Verd, St. Thomas, and Prince's Islands, Bissagos, Guinea, Angola, and Portuguese East Africa, with an aggregate area of 793,000 sq.m., and an estimated population of 8,400,000. A large part of the Portuguese possesions in Africa, however, are only nominally under their rule.

Population.—The population of continental Portugal in 1900 was 5,021,657 and, including the insular province of the Azores and Madeira, 5,428,659, or a density of 150.6 per sq.m., as compared with 4,660,095 and 5,049,729 in 1891. There were 2,597,270 males and 2,831,389 females, or 109 females to every hundred males. The rate of illegitimate births is 12.5 per cent of the total births.

Religion, Education.—In religion Portugal belongs almost exclusively to the Church of Rome, but all other forms of worship are tolerated; the Protestants, mostly foreigners, do not exceed 500, with chapels at Lisbon and Oporto. Portugal is divided into three dioceses, presided over by the Cardinal Patriarch of Lisbon, the Abp. of Braga, who is primate to the kingdom, and the Abp. of Evora; and these with the 14 bishops, belong to the Grandeza, or higher nobility. There are 100,000 parishes, each under a presbitero. The monasteries have been dissolved since 1834, but convents for nuns still exist. Portugal stands below the other countries of Europe in education; which is now superintended by a superior council, at the head of which is the minster of the interior. Public education is entirely free from the supervision and control of the church. Compulsory education was enacted 1844 but is far from fully enforced. There are nearly 4,000 elementary schools, with 180,000 pupils; 22 lyceums, with 8,260 pupils; numerous private schools; polytechnic academies at Lisbon and Oporto; and clerical, medical, agricultural, naval, and military training-schools. The one university at Coimbra (1300), one of the oldest in Europe, has 5 faculties, 75 professors, and about 900 students. Schools for training in the industrial arts are

in great favor; there are 28 in the country, headed by larger institutes at Lisbon and Oporto.

Government.—The Carta Constitutional of King Pedro IV., granted April 29, 1826, and amended at various times, is the fundamental law of the kingdom. The crown is hereditary both in the male and female line, but with preference of the male. The constitution recognizes four powers in the state—the legislative, executive, judicial, and moderating. The last, which is equivalent to the royal prerogative, is vested in the sovereign. There are two chambers, the Camara dos Pares and the Camara dos Deputados. The two are called the Cortes Gerães. The peers are nominated by the sovereign, who also nominates the president and vice-president of the chamber. The peerage is hereditary in the direct line, but the law of 1885 provided for the gradual abolition of hereditary peerages. To get a vote for the chamber of deputies one must be at least 21 years old, and pay a tax of at least 500 reis, or be able to read and write. A deputy must have 400 milreis per annum. A new parliament is convened without interval on the dissolution of the old. All laws relating to the army and taxation must originate in the chamber of deputies.

Judiciary and Local Government.—For judicial purposes Portugal is divided into comarcas, each having a court of first instance. There are appeal courts at Lisbon, Oporto, and Punta Delgada (in the Azores); and a supreme court at Lisbon. For the purposes of local government the six provinces of continental Portugal are subdivided into 17 districts, and the insular province into four, the Azores three, and Madeira one.

Race.—The Portuguese are a mixed race. In Algarve and Alemtejo, the Arabic element is still very perceptible, and the people of those provinces have dark-brown skins, and tall, slim, lithe, and active figures; while the natives of the more n. districts, with lighter skins, have less regular features, small eyes, and short, thick-set figures. Although the Portuguese may probably be regarded as the remains of the original population of the peninsula, they differ essentially from their Spanish brethren, whom they now regard with inveterate hatred and jealousy on account of their attempts a few centuries ago to destroy the independence of Portugal. They indulge in interminable verbosity, ceremonious flattery, and servile politeness, and they are inclined to extravagance and display. They are, however, intensely patriotic, brave, persevering, enterprising, hospitable, cheerful, and ready to oblige. As a people, they are dirty and slovenly; few persons among them have any great mental culture, and the lower orders are unable to read or write; hence the grossest superstition and bigotry prevail in every class of the population.

History of Portugal.—The earliest notice which we have of the w. portions of the Spanish peninsula is from the Romans, who followed the Carthaginians as con-

querors of the territories of the ancient Iberians and western Celts. Under Augustus, the peninsula was divided into three provinces, governed by pretors, of which the w. province of Lusitania comprised the greater part of the present kingdom of P., besides portions of Leon and Spanish Estremadura. When the Romans withdrew from the peninsula, which was rapidly overrun by Visigoths from the n., and later by Saracens from the s., Lusitania was overwhelmed in one common ruin with Iberia or ancient Spain. About the middle of the 11th c. it fell under the sway of Ferdinand I. of Castile. In 1095 Henry of Burgundy, who had married a natural daughter of Alfonso VI., King of Castile, successor of Ferdinand, received from that monarch the govt. of Portugal from the Minho to the Tagus, as a dependent fief. It is maintained, however, by Portuguese authorities, that even from this time the country was independent. His son, Alfonso I., gained signal advantages over the Arabs, and, by his gallantry and prudence, secured the affections of the people. After his great victory over the Moslems, in the plain of Onrique, in Alemtejo, 1139, his soldiers proclaimed him king. His successes on this occasion inflicted a serious check on the advance of the Infidels; and in recompense for the services which he had thus conferred on Christendom, the pope confirmed his title, which had been unanimously ratified by the Cortes of Lamego. The Burgundian House, which continued in possession of the throne 400 years, gave P. some of its noblest and best kings. The immediate successors of Alfonso I. were engaged in many severe struggles with the clergy and nobles, who were always ready to combine against the sovereign; but though the monarchs were often baffled in their attempts to uphold the independence of the crown, the dignity of the kingdom was, on the whole, maintained by the representatives of this family, who are, moreover, distinguished as promoters and upholders of the maritime glory of Portugal. Dinis (Dionysius), who succeeded Alfonso III. 1279, must be regarded as the founder of Portuguese commerce and mercantile enterprise. This king also encouraged the industrial arts, and protected learning, in furtherance of which he founded 1284 a university at Lisbon, which was transferred 1308 to Coimbra. Dinis was succeeded 1325 by his son, Alfonso, surnamed the Brave, whose reign was almost wholly occupied in wars with the Castilians and the Moslems. With Alfonso's grandson, Ferdinand I., the legitimate branch of the Burgundian House became extinct 1383. After some disturbances, his illegitimate brother, Joam (John), was recognized by the cortes as king 1385. His reign was eventful, not merely by reason of the internal reforms which he introduced, and of his steady maintenance of the prerogatives of the crown; but chiefly as associated with the commencement of those vast and important geographical discoveries and commercial enterprises, to which P. owed its

position during that and the succeeding age as the greatest maritime power of Europe. To Joam's son Enrique (Henry) the Navigator, is due the merit of having organized various voyages of discovery, and inaugurated a regular system of colonization, which, during the reign of Joam II. (who ascended the throne 1481), culminated in the successive acquisition by P. of the Azores, Madeira, Cape de Verde, and other islands; in the doubling of the Cape of Good Hope under Bartholomeo Diaz; and, as the result of the latter, in the successful achievement of the passage by sea to India, which was effected, in 1497, under the command of Vasco de Gama, in the reign of Joam's successor, Manoel. The discovery of Brazil, and the settlements made there and on the w. coast of India, increased the maritime power and fame of P., which were further extended under Manoel's son, Joam III., who ascended the throne 1521. At this period, P. ranked as one of the most powerful monarchies in Europe, and Lisbon as one of its most important commercial cities. Sudden as this course of prosperity had been, its decline was almost more abrupt, and may in great measure be referred to the influence of the priests, for the introduction into P. of the Inquisition 1536, led to the expulsion of the numerous wealthy and industrious Jews, on whose able financial management the commercial interests of the Portuguese were largely dependent, and gave rise to an amount of social tyranny and oppression, both in P. and its colonies, which, coupled with a bad system of government, depressed the energy and crippled the resources of the nation. The influence of the Jesuits under the minority of Joam's grandson, Sebastian, and their evil counsels in urging the young king to enter on a fatal expedition to Africa against the Infidels, led to still further miseries. The defeat of the Portuguese, and the capture and death of their young king at the battle of Alcazar 1578, and the extinction of the old Burgundian line 1580, after the brief reign of Sebastian's uncle, Enrique, plunged the country into difficulties and misfortunes of every kind, which lost none of their weight, though they changed in character. After a struggle for the throne between many eager candidates, none of whom found favor with the nation at large, which persisted in the delusive hope that Sebastian was still alive, and would return from the hands of his Infidel captors, Philip II. of Spain succeeded in securing the crown of P., and annexing the Portuguese kingdom to the Spanish monarchy. This event proved disastrous in the extreme to P., for, besides bringing the country to the brink of ruin, by mal-administration and misappropriation of its resources, it involved it in all the ruinous wars of Spain in the Low Countries and in Germany, a great part of the expenses of which it was made to bear; while the Dutch, in retaliation for Spanish aggressions, attacked the Portuguese settlements in Brazil, and almost completely deprived them of their possessions in the Indian archi-

pelago. The insolence of Philip IV.'s minister, Olivarez, brought matters to a crisis; and 1640, after a forced union of 160 years, P. was freed, by a bold and successful conspiracy of the nobles, from all connection with Spain, and the Duke de Braganza, descendant of the old royal family, placed on the throne, under the title Joam IV. The war with Spain, the natural result of this act, ended 1668, when, by the treaty of Lisbon, the independence of P. was formally recognized by the Spanish govt. For the next hundred years, P. vegetated in inglorious apathy. Her ancient glory had departed never to return, the nation was steeped in ignorance and bigotry, and from having been one of the greatest maritime powers of Europe, the Portuguese were content with becoming a commercial dependent, rather than ally, of Great Britain. Under the reign of Joseph I., who died 1777, the genius and resolution of the minister, Pombal (q.v.), infused temporary vigor into the administration, and checked for a time the downward tendency of the national credit. Pombal's efforts to rouse the people from their sloth, and infuse vigor into the govt., were frustrated by the accession of Joseph's daughter, Maria, who, with her uncle-husband, Pedro III., allowed things to fall back into their old channels. The mental alienation of Maria led, 1789, to the nomination of a regency under her eldest son, Joam. This prince, who showed considerable capacity in early life, finding that he could not maintain even a shadow of independence on the outbreak of the war between Spain and France, threw himself wholly on the protection of England; and finally, when he learned that Napoleon had determined on the destruction of his dynasty, left P. 1807, accompanied by all his family, and transferred the seat of his govt. to Rio Janeiro, cap. of Brazil. This act was immediately followed, on the part of the French, by the occupation and annexation of P.—a measure which gave rise to the Peninsular War. The victory of Vimeira, by the combined English and Portuguese army 1808, freed the land from its French assailants; and 1810, on the death of Queen Maria, the regent succeeded to the joint crowns of P. and Brazil. The continued residence of the new king, Joam VI., at Rio Janeiro, gave occasion to abuses and discontent, which resulted 1820 in the outbreak of a revolution at Lisbon, and the proclamation of a constitutional form of govt., instead of the pre-existing absolutism. After a period of great national excitement and political disturbance, the differences between the sovereign and people were so far adjusted, that Joam agreed to and signed the constitution of P., and ratified the independence of Brazil, which was to be governed by his son, Dom Pedro, while he himself retained only the title of emperor. On the death of Joam 1826, Pedro IV., after organizing the govt. of P. on the model of the French charter, renounced the Portuguese crown in favor of his daughter, Doña Maria da Gloria, on condition of her marriage with her uncle, Dom Miguel. The lat-

ter, who, during the lifetime of Joam, had availed himself of every opportunity to thwart the more liberal policy of his father and brother, waited only for the embarkation of the English troops to break the oath which he had taken to maintain the constitution, and gathering round him all who were in favor of restoring the old order of things in P., he was through their aid declared king by the Cortes, which met 1828, June. A period of indescribable confusion, misrule, and anarchy followed. The nobles, monks, and rabble ruled the land; 13,000 Portuguese citizens went into exile, while double that number of persons, suspected of favoring the Constitutional party, were kept in confinement. At length, 1832, Dom Pedro was enabled, chiefly by a loan from Englishmen, to raise a fleet, and make a landing at Oporto. Admiral Napier, in the meanwhile, operated on the coast of Algarve successfully in favor of the young queen, whose cause, by these victories, and the support of an alliance with the great powers, finally proved victorious. Doña Maria made her entry into Lisbon 1833; and in the following year Dom Miguel signed the Convention of Evora, by which he renounced all pretensions to the throne, and agreed to quit Portugal. The death of Dom Pedro in the same year, after he had effected several important reforms, proved a heavy misfortune to P., which suffered severely from the mercenary rule of those who occupied places of trust about the person of the young queen. Her marriage 1835 with Augustus, Duke of Leuchtenberg, his death at the end of a few months, and her second marriage 1836 with Prince Ferdinand of Saxe-Coburg, were followed by grave political disturbances, which became aggravated by the personal avarice and want of good faith of those in whom the young queen placed her confidence. A branch of the democrats, known as the Septembrists, from the month in which they made their first decisive stand against the govt., loudly demanded the abrogation of the charter promulgated by Dom Pedro (and known as the *Carta de ley de* 1826), and the restoration of the constitution of 1820. This contest of the charters may be said to have continued through the entire reign of Doña Maria. The govt. was alternately in the hands of Septembrists and Chartists, toward both of whom the queen acted with a duplicity that frustrated every effort at adjustment of the national disorders. Insurrections and counter-insurrections were frequent, the troops were not to be trusted in moments of emergency; guerilla bands scoured the country at will, and openly defied the queen's authority. The Absolutists, or Miguelites, took advantage of the general disorder to produce a reaction in favor of the old church party. The financial embarrassments were complicated in the extreme; while the obstinacy of the nation in maintenance of the slave-trade, in defiance of treaties and pledges, brought P. into temporary collision with Great Britain, the only ally on whom Doña Maria could rely. An

armed intervention of the great powers 1847 produced a partial abatement of the national disorders; and matters might have permanently improved, had not the queen's partiality for her unpopular ministers, Count Thomar and his brother Cabral, and her determination to leave the administration of affairs in their hands, exasperated the general discontent and distrust of the court, and led to the insurrection, which, without bloodshed, made the national favorite, the Marquis de Saldanha, *de facto* military dictator of Portugal, and evoked a general expression of the popular wish for the queen's abdication. Saldanha's ministry, though begun under good auspices, soon showed the same readiness to succumb to the views of the court which had characterized former ministries. One cortes was dissolved after another; finally, 1852, the govt. declared itself prepared to carry out necessary reforms without concurrence of the cortes, and to demand at a future period a bill of indemnity for its acts. At this crisis, the queen died suddenly, and her eldest son ascended the throne 1853, as Pedro V., under the regency of the king-consort his father. The latter used his power discreetly; and by his judicious management, the financial disorders were partially adjusted. Upon the sudden death 1861 of Pedro, his brother was proclaimed king as Luis I. He died 1889, Oct. 19, and was succeeded by his eldest son, proclaimed king as Carlos I. Dec. 28. Concessions for the construction of a railroad from Delagoa Bay to Pretoria were granted by King Luis to Edward McMurdo, an American citizen, 1876; and the Portuguese govt. announced 1887, Nov. 1, the completion of the road to a frontier station on the Komati river, and that the section from Komati to Pretoria would be finished by a company working with a subsidy from the Transvaal govt. Soon afterward it was stated that the Portuguese and Transvaal govts. would probably fix the frontier a considerable distance from the Komati station, thus necessitating an extension of the line. 1889, May 8, Mr. McMurdo died, and, the same day, the Portuguese govt. declined to extend the time for finishing the road to the new alleged frontier station; and June 26 the govt. cancelled the concession, because the road had not been completed within the specified time. This action, despite remonstrances from Great Britain and the United States, whose citizens had large money interests in the scheme, was followed by the dispatch of English gun-boats to Delagoa Bay, and the filing in Washington of a claim of damages ($750,000) against P. by Mrs. McMurdo. 1890, Apr. 26, the U. S. and British govts. made an imperative demand that the question be settled by arbitration; May 2, P. accepted the principle of arbitration conditionally; May 5 it accepted it without reserve; and June 4 submitted a counter-proposal that an impartial nation should first decide whether the matter was a proper case for arbitration; and if it decided in the affirmative, that the same nation should decide the terms of settlement. In the mean

time the government of Portugal issued a proclamation claiming countries north and south of the Zambesi river, Africa, including Mashonaland, over which Great Britain asserted a protectorate, and extending from Angola, on the west to Mozambique on the east. Great Britain protested against the proclamation, Nov., 1889, and Portugal hastened expeditions to occupy the disputed territory. Jan., 1890, Great Britain demanded the immediate recall of all Portuguese forces from the banks of the Shiré, beyond the confluences of the Ruo, and south of the Zambesi, and from Mashonaland. The cabinet of Portugal yielded to this ultimatum Jan. 12, and the same day a mob attacked the British legation in Lisbon. Popular clamor was strong against the government of Portugal, the cabinet was forced to resign, and an alleged republican uprising occurred in Lisbon, Jan. 31, 1891, which required the presence of troops to suppress. This action was followed by repressive measures against the Republican press, which had been stimulated in its attacks on the government by the success of the bloodless revolution in Brazil in 1889, when the Republicans of that country expelled the emperor Dom Pedro II. and proclaimed a federal republic on Nov. 15 of that year. The success of the cabinet in these measures greatly enhanced its prestige with the chambers, which immediately approved the convention with Great Britain in its original form and ratified the treaty on May 28.

The finances of the country for several years had been subjected to severe strain chiefly because of the careless and extravagant manner in which the railroads guaranteed by the government had been managed, and affairs reached a crisis when the government was forced to suspend the payment of the coupon of the Railway State Loan, due Jan. 2, 1892. This compelled the resignation of the minister of finance, Marianino de Corvalho, and on Jan. 15 of the other members of Sousa's cabinet, who were replaced by a ministry of which Diaz Ferreira was premier and Oliveira Martins minister of finance. Martins, however, unable to secure sanction for his schemes for the financial rehabilitation of the country, resigned in the following May and the government issued a decree reducing the payments to foreign bondholders to one-third the amount, thus declaring the country bankrupt, to which illegal action the foreign bondholders strenuously objected.

In the elections of October, 1892, the conservatives secured a substantial majority and the ministry was reconstructed along conservative lines, but the premier Ferreira, was unable to convince the king of the merit of his financial policies and consequently the cabinet resigned in Feb., 1893, to be succeeded by a Liberal ministry under Hintze-Ribeiro. This ministry greatly improved financial conditions but the reforms in taxation proposed in 1894 by the minister of finance met with such opposition that the premier exchanged portfolios

with the minister of finance, Lobo d'Avila, in order the better to push this legislation. But his proposals were rejected by the cortes and after long efforts to remove the economic difficulties under which the country labored, his ministry was forced to admit defeat and in Feb., 1897, resigned. The government, however, was forced to come to an agreement with its foreign creditors in March, 1898.

In the meantime sweeping parliamentary reforms had been put into effect, the law of March 28, 1895, reducing the membership of the lower chamber from 170 to 145 deputies and the law of Sept. 25 reducing the upper chamber to 90 members, and the latter, instead of being elected, were by this law to be chosen by the king, the bishops and the royal princes. The right of suffrage, denied to soldiers, government servants and domestic servants, was given to every responsible male citizen of 21 years of age, who could read and write or who paid 500 reis in taxes.

During the South African war the government was severely attacked for granting a search-warrant for contraband of war to the British consul at Lourenço Marques and for allowing an armed force under General Carrington to pass through Portuguese territory from Beira to Rhodesia. The ministry resigned and Hintze-Ribeiro formed a new Conservative ministry. On March 29, 1900, Swiss arbitrators declared in favor of the government with regard to its seizure of the Delagoa Bay railway, but awarded 15,314,000 francs as compensation to its owners, which sum was loaned by the Portuguese Tobacco Company.

In 1900 tension between Portugal and the Netherlands with regard to affairs in South Africa caused the withdrawal of their respective ministers on Dec. 7, but the trouble was amicably settled.

On Feb. 1, 1908, as the king and queen, with their two sons, Louis Philippe (b. 1887) and Manuel (b. 1889), were returning to the palace in Lisbon from a pleasure outing, they were attacked by several armed men and the king and Louis Philippe were killed instantly and Manuel was severely wounded on the arm. Now being the direct successor to the throne, Manuel was proclaimed king as Manuel II., on Feb. 2. It subsequently developed that Carlos had been extremely extravagant in his expenditures and later exposures forced the premier to flee from the country. Manuel, however, organized a new cabinet and endeavored to disentangle the financial difficulties into which the kingdom had fallen.

PORTUGUESE, a. *pŏr'tū-gēz:* of or from Portugal: N. the people or language of Portugal.

PORTUGUESE GUINEA: a n.w. African colony on the Atlantic coast, extending from the Cacheo river southward to Katafine, and eastward to lon. 13° W., its boun-

daries on all its land sides, fixed by the convention of May 12, 1886, being the French Senegambian possessions. The Bissagos archipelago with other islands off the coast belong to the colony, which has an area of 4,440 sq.m. The capital and chief port is Bulama on Bulama Island; other trading ports are Bissao, Bubah, Geba, and Cacheo. The coast is indented by the estuary of the Rio Grande river with its numerous deltaic islands; the colony from the eastern mountains westward lies on both sides of the river, and is mainly an alluvial plain covered with tropical forests and vegetation. Rice and millet are cultivated. The chief commercial products, largely controlled by the French, are rubber, ivory, hides, oil-seed, and wax. The colony is administered by a Portuguese governor and council. The United States in 1870 as umpire settled the long-standing disputes between Great Britain and Portugal over this territory in favor of the latter. Pop. 820,000.

POR'TUGUESE LANGUAGE AND LITERATURE: one of the Romance family of languages—and its literature; developed in the s.w. portion of the Spanish peninsula. The Portuguese, like every other branch of the Romance family of languages, has grown out of a local form of the *Lingua Romana Rustica*, on which in course of time had been ingrafted many elements of Arabic from the Saracen invaders of the country, and numerous verbal and idiomatic characteristics of the Frankish and Celtic dialects, introduced with the Burgundian founders of the Portuguese monarchy. The earlier forms of Portuguese bore close affinity with the Galician, and though, in course of time, it presented strong resemblance to its sister language, the Castilian, as far as both possessed numerous words of identical origin, it yet differed so widely from the latter in grammatical structure, as almost to merit the designation of an original tongue. The antipathy between the Portuguese and Spaniards, and the consequent strenuous efforts of the best Portuguese writers to keep their language distinct, and to resist the introduction of further Castilian elements, had the effect of making Portuguese still more dissimilar from the sister tongues of the peninsula; and the result was the production of a language differing from pure Spanish in having an excess of nasal sounds, and fewer gutterals, with a softening or lisping of the consonants, and a deepening of the vowels, which renders it the softest, but least harmonious, and the feeblest of all the Romance tongues. The earliest specimens of genuine Portuguese belong to the beginning of the 13th c., and consist mostly of collections, or books of songs (*Cancioneiros*), which, both in form and rhythm, resembled the troubadour or *minne* songs of the same period. Of these, the oldest is the *Cancioneiro dél Rei Dom Diniz*, or Book of Songs, by King Diniz, who had long been regarded by the Portuguese as their earliest poet, but

whose poems were supposed to be lost, till they were discovered, in the earlier part of the 19th c., in MS. in the library of the Vatican, and published at Paris and Lisbon 1847. In the 14th and 15th c. the court continued to be the centre of poetry and art, as it had been under Diniz; but Castilian was in greater vogue than Portuguese, which was despised by the numerous royal poets, who emulated the example of Diniz, and composed love-songs and moral or didactic poems. Under the culture of these courtier bards, the poetry of Portugal remained weak and effeminate, without acquiring even the tenderness and pathos which characterized the Spanish romances of that age. The poetry and literature of Portugal acquired new vigor with the growth of her maritime and commercial glory; and the *Cancioneiro Geral* (Lisb. 1516) of the poet Garcia de Resende, which gives a general summary and extracts of all the Portuguese poets of the latter half of the 15th and beginning of the 16th c., affords evidence of this improvement, which is most strongly exemplified in the sentimental pastorals or romances, and the national eclogues of Bernardino Ribeiro and Sá de Miranda, whose eclogues and prose dramatic imitations of Plautus and Terence, mark the transition period between the mediæval lyrical and the later classical style. These first attempts at the drama were followed by Antonio Ferreira, whose *Inez de Castro* is the oldest Portuguese tragedy. But the classical school, whose chief cultivators were the courtiers of Lisbon and the professors of Coimbra, found little favor among the people at large, for the discoveries and conquests of the nation in Asia, Africa, and America, excited an enthusiasm and self-consciousness in the people, which led them to crave something more practical and natural than the stilted style of the classicists. At this crisis, when P. was at the zenith of her material prosperity, appeared her greatest poet, Camoens, who, in his immortal epic, *Os Lusiadas* (q.v.), 1572 struck out a new path in the domain of epic poetry; while his numerous sonnets, 300 in number, his *Canções*, or songs, his *Redondillas*, dramas, and other poetic productions, exhibit a versatility of genius and graceful tenderness which place him in the foremost rank of European poets.

With Cameons and his contemporary, Gil Vicente, the language and poetry of P. reached the culminating point of their development. During the dominion of Spain, the Portuguese so far lost all feeling of national independence and patriotism, that they at length renounced their native tongue, and adopted the language of their foreign rulers. With the restoration of political independence, under the sway of the Portuguese House of Braganza, a reaction took place; but the 17th and 18th c. produced few Portuguese writers who attained more than an ephemeral and purely local reputation—bombast, or slavish imitation of Spanish and Italian writers, being the predominant characteristics of the

Portuguese school of light literature. Some good historical writers belong, however, to this period; among whom were Jacinto Freire de Andrade, whose life of Joao de Castro, Viceroy of India, still holds its place as the most perfect monument of classical prose; the great Indian missionary, the Jesuit Father Antonio Vierra (d. 1699), whose sermons and letters—of which a collection was published at Lisbon 1748, and at Paris 1838—are regarded by his countrymen as models of style and diction; F. X. da Meneses, author of *O Portugal Restaurado* (1741), etc. In the beginning of the 19th c., Portuguese poetry was partially redeemed from its previous low grade by two men, who, though they professed to observe a strictly classical style, possessed a delicacy of taste, and a genial creative power, which saved them from falling into the absurdities that had generally characterized the school in Portugal. The elder of these two, F. M. do Nascimento, who died in exile at Paris 1819, though noted specially as an elegant lyrist, deserves notice for his gracefully written miscellaneous papers; while Manoel de Bocage, his less cultivated rival and contemporary, must undoubtedly be regarded as the most original and truly national of the modern poets of Portugal. His sonnets rank as the finest in the language, and these, with his numerous idyls, epigrams, and occasional poems, in various styles and modes of versification, have had a host of imitators, among the best of whom are the dramatist J. B. Gomes, J. M. da Costa e Silva; the satirist, T. da Almeida; and the Brazilian, Antonio Caldas, distinguished for his sacred epics, and various imitations of Milton and Klopstock. The best of the recent Portuguese poets are M. de Albuquerque, A. de Castilho, and A. de Carvalho, and J. B. d'Almeida Garrett. The last-named, whose collected poetic and prose works appeared at Lisbon 1840, was the most versatile and popular writer of his time in Portugal. In the departments of travels, geography, and history, P. has produced good writers from the earliest periods of its literary history; and in recent times, the works of B. Machado, J. Ferreira, and A. de Cajo, have well maintained the national reputation.—Portuguese literature is cultivated also in Brazil, and, of late years, with more success than in the parent country. The principal names in Brazilian, poetry are, Gonçalves Diaz, Macedo Abreo, and Magalhaens; in history, Varnhagen, author of the *Historia general de Brazil* (1854), and P. da Silva, author of the *Brazilian Plutarch;* besides some divines, philosophers, and translators from the classics.

PORTUGUESE MAN-OF-WAR (Jelly-fish): see ACALEPHÆ.

PORTULACEÆ, *pōr-tū-lā'sē-ē.* or PORTULACACEÆ, *pōr-tū-lâ-kā'sē-ē:* natural order of exogenous plants, nearly allied to *Caryophyllaceæ,* from which it differs chiefly in the generally perigynous stamens, the calyx consisting of two sepals united at the base, and the capsule frequently opening transversely. The species are not very numerous; they are much diffused over the world, and are shrubby or herbaceous, generally succulent, growing mostly in dry places. The flowers are often large and beautiful, but ephemeral. The foliage is bland and insipid. Some species are used as salads and pot-herbs, of which the best known is Purslane (q.v.). The tuberous roots of *Claytonia tuberosa,* a Siberian plant, are used for food, as are those of the Melloco (*Melloca tuberosa* or *Ullucus tuberosus*), a Peruvian plant sometimes referred to this order. The genus *Calendrinia* furnishes some beautiful annuals.

PORT WINE, *pōrt wīn* (i.e., *Porto* or *Oporto Wine*): species of red wine, hot and heady; produced chiefly in a mountainous district of Portugal, called Cïma de Douro, and exported from Oporto and Lisbon. The vine from which this wine is produced is planted generally on craggy slopes with a s. exposure. The grapes are gathered from Sept. 1 to Oct. 15; the cultivation and gathering employ annually 10,000 cultivators and 20,000 gatherers. Port wine, when pure and unadulterated (very seldom the case), does not acquire its full strength and flavor till it has stood for some years, but care must likewise be taken that it is not allowed to become too old. The color of new port wine varies from pale rose to deep red, and changes with age, becoming permanently a deep tawny brown. By far the greater portion of the wine made is mixed with spirit even during the time of fermentation, in order to give the new wine the ripeness and strength which exporters require, and which the wine does not naturally attain till it has stood for some time; the proper color is also given by an ingredient known as *jeropiga,* a preparation of elder-berries, molasses, raisin-juice, and spirit. It is an excess of this jeropiga in the inferior sorts of port which communicates to them the medicated odor frequently noticed. The extreme 'headiness' of port is due chiefly to the liberal admixture with spirit, and this is the case with all the sorts generally exported.

PORUS, *pō'rŭs:* king of a region of India e. of the Hydaspes. With an army he tried to prevent Alexander's advance across that river, but he was defeated and made prisoner. Alexander restored him to his kingdom, with enlarged boundaries. Porus was thereafter the faithful ally of the Macedonians, but after the departure of Alexander was put to death by Eudemus, commander of the Greek army of occupation.

POSADA, n. *pō-sâ'da* [Sp.]: an inn.

POSAUNE, n. *pō-zow'nĕ* [Ger. trombone]: reed-stop on the organ, of rich and powerful tone; its pipes are 8 ft. on the manuals, 16 or 32 ft. on the pedals.

POSCHA'REVATZ. See PASSAROWITZ.

POSE, v. *pōz* [F. *apposer*, to lay, set on or near to; *poser*, to set or lay: L. *appositus*, put or placed at or near —from *ad*, to or at; *positus*, put or placed—whence *apposite*, as applied to answers]: to put or bring to a stand by a question or by questions; to puzzle; to perplex by asking questions difficult to answer. PO'SING, imp.: ADJ. puzzling; bringing to a stand by a perplexing question. POSED, pp. *pōzd*. POSER, n. *pō'zėr*, one who asks questions difficult to answer; a question difficult or impossible to reply to; an examiner.

POSE, n. *pōz* [F. *posé*, placed—from *poser*, to set or lay]: in *paint.* and *sculp.*, the attitude which the character represented is considered to have taken naturally; a position formally assumed for the sake of effect: V. to assume a position or character. POSÉ, a. *pō-zā'*, in *her.*, standing still with all his feet on the ground, as the attitude of a lion or other beast. POSES PLASTIQUES [Fr. statuesque attitudes]: equivalent to Tableaux Vivants (q.v.).

POSEIDON, *pō-sī'dōn:* in Greek mythology, the lord of the sea, identified by the Romans with the Italian deity Neptune. He was a son of Cronus and Rhea, and hence a brother of Zeus, Hades, Hera, Hestia, and Demeter. His usual residence was in the depths of the sea near Ægæ, in Eubœa, where he had a palace, and kept his horses with brazen hoofs and golden manes. He is called the earth-holder or earth-encompasser, as the sea surrounds the earth, and the earth-shaker, as the earth is shaken by the waves of the sea beating on the shore. He is the ruler of all other marine deities and of all animals that live in the sea. He gathers clouds, and raises storms and allays them. In several myths he is represented as contending with some land divinity for the possession of particular spots of earth. The horse, and more particularly the war-horse, was sacred to Poseidon, and one of the symbols of his power. The dedication of this animal to the seagod was probably due to the resemblance which the Greeks detected between the swift springing movement of the horse and the advance of a wave, or between the curve of a wave about to break and the arch of a spirited horse's neck. The other well-known symbol of his power is the trident, or three-pronged sceptre. During the Trojan war Poseidon was the constant enemy of Troy because of the ingratitude shown him by Laomedon, the second king of Troy, and the builder of the walls of the city. The worship of Poseidon was common throughout Greece and the Greek colonies, but especially prevailed in the maritime towns.

POSEN.

POSEN, *pō′zĕn:* province of Prussia, bounded n. by Pomerania and E. Prussia, e. by Poland, s. by Silesia, w. by Brandenburg and Pomerania; 11,178 sq. m. Pop. (1900) 1,887,275. It is divided into the two governmental districts of Posen and Bromberg; and the principal towns are Posen, Bromberg, Lissa, Rawitsch, and Gnesen. The principal river is the Wartha, which traverses P. from e. to w., and is navigable throughout the greater part of its course, as is also the smaller Netze. The country is almost everywhere level, and its surface extensively covered with bogs, ponds, and small lakes. The soil is on the whole fruitful, and the numerous swamps and forests which covered the land during its annexation to Poland, have of late years been converted into rich meadow and good arable land, where cattle of superior quality are raised, and good crops of wheat, barley, oats, and flax are procured. The forests are extensive and productive, and contribute largely to the exports of the province, of which, however, the most important articles are corn, wool, tallow, hides, wax, and honey. Except coal, obtained from beds near the town of Wronki, P. has no mineral products. Good broadcloth, linens, and lace are manufactured in many of the small country-towns. Since the annexation of P. to Prussia, much has been done to supply the previous deficiency in popular instruction; and there are now nine gymnasia, several normal and training schools, a seminary for priests, and more than 2,000 burgher and national schools. The greater part of the people belong to the Rom. Cath. Church, which is under the spiritual jurisdiction of the Abp. of P. and Gnesen. Of the remainder, 53,000 are Jews. The inhabitants may still be said to be Poles, more than 800,000 persons using Polish as their mother-tongue. P. formed an integral part of Poland till 1772, when, at the first partition of the Polish territory, the districts n. of the Netze were given to Prussia. At the second and third partitions, 20 years later, the remainder was incorporated in the Prussian kingdom under the name S. Prussia. In 1807 P. was included in the duchy of Warsaw; but by the act of the Congress of Vienna, it was separated 1815 from Poland, and re-assigned to Prussia under the title of the Grand Duchy of Posen. In 1848, the Poles, who had never amalgamated with their new German compatriots, took advantage of the general political excitement of that period to organize an open rebellion, which gave the Prussian govt. considerable trouble, and was not put down till much blood had been spilled on both sides. On the cessation of disturbances, the German citizens of the province demanded the incorporation of P. with these Prussian states which were members of the German Confederation, and the Berlin chambers gave their approval of the proposed measure 1850; but on the subsidence of revolutionary sentiment in Germany, the subject was dropped.

PO'SEN (Polish *Poznan*): chief town of the province of P., and a Prussian fortress of the first rank; on the low and sandy banks of the Wartha, nearly 150 m. e. of Berlin. Of the people, not quite half are Protestants, and about 10,000 are Jews. P., which ranks as one of the most aneient eities of Poland, beeame the seat of a Christian bishop in the 10th e. Till 1296 it was the seat of the Polish dukes; and it was a member of the Hanseatic League during the middle ages, when it was an important trading mart between w. Europe and the Slavonic lands bordering on Asia. At this time many German, English, and Seottish traders settled in P., whieh latterly fell into deeay. It passed into the possession of Prussia 1815. At the great fire of 1803, when many of the older parts of the town were destroyed, P. lost the most striking features of its semi-oriental style of architeeture; but it still retains a eertain pieturesque charaeter, from the number of its ehureh towers and lofty houses. Among its 15 prineipal ehurehes, the most noteworthy are the eathedral, recently restored and elaborately ornamented; and St. Stanislaus, a splendid specimen of Italian arehitecture. Fortifieations, making P. a fortress of the first rank, were nearly finished, after seven years' labor, 1883. It is the see of an abp., and has a fine town-hall, two gymnasia, a public library with 20,000 vols., training-sehools for teaehers of both sexes, a theatre, ete. It now has many fine regularly built streets and squares, in whieh are the winter residenees of many of the provincial Polish nobles. A considerable trade in wood, corn, wool, broadcloth, and linen is carried on here, principally by the Jews; and the annual fairs in summer attract large crowds from all parts of the province. The chief manufactures of P. are eloth, leather, carriages, copper vats and other vessels used in distilling, and tobacco: there are also breweries, distilleries, and sugar-refineries.—Pop. (1880) 65,713; (1890) 69,627; (1900) 117,033.

POSEY, *pō'zĭ*, THOMAS: soldier: 1750, July 9—1818, March 19: b. Va. He beeame quartermaster of a division of Lord Dunmore's army, and was in the battle with the Indians at Point Pleasant (q.v.), 1774, Oct. 10. As capt. in the 7th Va. eontinental regt. he took part in the engagement at Gwynn's Island 1776, July 8. He distinguished himself in the battles of Bemis Heights and Stillwater 1777, under Gen. Horatio Gates. As maj. he eommanded the expedition against the Indians in the Wyoming valley 1778. At Stony Point P. was among the first to enter the enemy's works. He then served in S. C. and in Ga. After the war he settled in Spottsylvania co., Va., where he held eivil offiee. He was a brig.gen. in Wayne's eampaigns against the Indians of the n.w. 1793–4. Then he beeame a eitizen of Ky., and was eleeted to the legislature. He moved to La.; was U. S. senator 1812, Dee. 7—1813, Feb. 5, when he was appointed gov. of Indiana Terr. At his death he held the office of Indian agent.

POSIDONIUS, *pŏs-ĭ-dō′nĭ-ŭs*, surnamed THE RHODIAN: philosopher: abt. B.C. 135—B.C. 51; b. Apamea, Syria. He was a pupil of Panætius at Athens and later a teacher of philosophy at Rhodes. He was recognized as the head of the stoic sect in his time, but in his doctrine he made a compromise between the stoic and the peripatetic tenets. At the age of 50 yrs. he went as ambassador to Rome, and was a teacher of Cicero and Pompey. His writings, metaphysical and mathematical, have perished except fragments, pub. in Müller's *Fragmenta Historica Græca* (Paris 1849, III.).

POSILIPO, *pō-sē-lē′pō:* mountain on the n.w. of Naples, close by the city, remarkable for the tunnel known as the Grotta di Posilipo, through which the road from Naples to Pozzuoli (anc. *Puteoli*) passes. The grotto is in some places 70 ft. high, and 21 ft. wide, and is 2,244 ft. long. It is very ancient. Seneca mentions it as the *Crypta Neapolitana.* Strabo assigns its construction to M. Cocceius Nerva, supt. of aqueducts in the time of Emperor Tiberius. Above the e. archway of the grotto is the so-called 'Tomb of Virgil.' At the base of the hill of P. anciently stood the poet's villa, in which he composed the *Eclogues*,and *Georgics*, perhaps also the *Æneid.* During the middle ages, the common people firmly believed the grotto to be the work of the poet, whom they regarded as a great magician.

POSIT, v. *pŏz′ĭt* [L. *positus*, put or placed—from *ponĕrĕ*, to place]: to dispose; to range; in *logic*, to lay down, as a position. POS′ITING, imp. POS′ITED, pp.: ADJ. set; placed; ranged.

POSITION, n. *pō-zĭsh′ŭn* [F. *position*, position—from L. *positĭōnem*, a putting or placing: It. *posizione*]: the state of being placed or set; situation; place; attitude or posture, as of a model or object to be copied; a principle advanced or laid down; state of affairs; condition; state; a rule in arithmetic.—SYN.: place; point; situation; posture; attitude; station; location; locality; ground; spot; condition; proposition; assertion; thesis; principle.

POSITIVE, a. *pŏz′ĭ-tĭv* [F. *positif:* L. *positīvus*, settled by arbitrary appointment or agreement—from *positus*, put, placed; *ponĕrĕ*, to place: It. *positivo*]: not admitting any condition or discretion; opposed to negative; absolute; direct; explicit; not implied; real; over-confident in opinion or assertion; dogmatical; affirmative; settled by arbitrary appointment; very certain; in *gram.*, applied to the state of an adjective, when without any increase or diminution in its signification, as good, bad: N. that which is capable of being affirmed; reality; a word which affirms or asserts existence. POS′ITIVELY, ad. *-lĭ*, absolutely; really; in its own nature; directly; expressly; in strong terms. POS′ITIVENESS, n. *-nĕs*, undoubting assurance; full confidence. POSITIVISM, n. *pŏz′ĭ-tĭv-ĭzm*, system of philosophy, originated by Auguste Comte (q.v.), which excludes from philosophy everything except the natural phenomena or properties of knowable things,

and which holds all inquiry into causes, whether efficient or final, to be useless and unprofitable (see below). Pos′-ITIVIST, n. *-ist*, one who believes in positivism. POSITIVE ELECTRICITY, the quantity of electricity which a body contains beyond its natural condition; that kind of electricity evoked on glass by rubbing with silk (see ELECTRICITY). POSITIVE QUANTITY, in *alg.*, an affirmative quantity, or one to be added, which is distinguished by the sign (+) plus. POSITIVE POLE, in the *voltaic battery*, the end of the wire which is said metaphorically to give off the electric fluid; the other, which receives the fluid, is called the *negative pole*.—SYN. of 'positive, a.': actual; definite; absolute; certain; real; arbitrary; despotic; direct; dogmatical; stubborn; explicit.

POS′ITIVE PHILOS′OPHY: see POSITIVISM: COMTE.

POSITIVE PRINTING, in Photography: term denoting that process by which impressions from a Negative (q.v.) are produced upon suitably prepared paper. The term, however, does not belong exclusively to positives produced on paper, and intended to be viewed by reflected light, since transparent positives for examination by transmitted light are produced on glass also. These are obtained in a manner very similar to the dry negative collodion process. For the whole subject, see PHOTOGRAPHY. This article deals with the obtaining of positive proofs on paper.

If we regard the negative not as the picture but as the means of producing one, the first thing which presents itself for notice is the paper. This may be either German or French, known in the markets under the respective names Saxe and Rive. They are used in the simply salted condition, or more usually in the salted and albuminized state, the purpose of the albuminizing being to prevent the chemicals used in the process from sinking into the paper, whereby the delicate details of the negative would become defective on the surface. The process is briefly as follows: Float the paper on the salting bath one to five minutes; drain for one minute; hang up to dry. Float the paper on the exciting bath five to ten minutes, according to its strength; drain, and hang up to dry. Expose in a pressure-frame under a negative. The necessary depth of impression being obtained (a point to be determined only by experience), wash the print in common water. Some operators at this stage immerse the print in a bath containing one per cent. of ammonia for two or three minutes. This is not absolutely necessary; should it, however, be done, the print should be afterward washed in water for five or ten minutes; after which it is immersed in the toning bath one to ten minutes, or until the desired *tone* be obtained; it is then washed in several changes of water, preparatory to immersion in the fixing bath. This last operation occupies 15 to 30 minutes, according to the strength of the fixing solution, and the depth to which the printing has been carried. The print is then copiously washed in *many* changes of water, and hung up to dry.

The *baths* referred to above are composed as follow: *Salting Bath*, water, 1 ounce; albumen, 4 ounces; good common salt, 48 grains. *Exciting Bath*, nitrate of silver, 240 grains; water, 4 ounces; glacial acetic acid, half a dram. *Toning Bath*, chloride of gold, 4 grains; water, 24 ounces; carbonate soda, 100 grains. *Fixing Bath*, hyposulphite of soda, 4 ounces; water, 1 pint.

Printing in carbon, lamp-black, or other impalpable powder, which had long been desired by reason of doubts as to the stability of silver prints, has been brought to a considerable degree of perfection. It is based on the discovery by Mungo Ponton, that a mixture of gelatine and bichromate of potash is rendered insoluble by the action of light; and on the experiments of Poitevin, Fargier, and Blair. There are three typical processes—*Autotype*, *Woodburytype*, and *Lichtdruck*. The *Autotype* consists in coating a sheet of prepared paper with a mixture of gelatine, bichromate of potash, and carbon, and when dry, exposing it under a negative. On removal from the printing-frame, the pigment is moistened with water, and laid, prepared side down, on a support of glass, zinc, or shellac-coated paper, to which a gentle pressure makes it adhere. The paper is then removed, and the print developed by immersion in warm water, which dissolves the unaltered gelatine, but cannot touch the parts rendered insoluble by the light which has passed through the negative. The developed print is again transferred to paper, when the high lights are found to consist of those parts where the gelatine has been completely dissolved, the middle tints of the parts less soluble, and the shadows of the parts quite insoluble.—In the *Woodburytype*, a bichromated gelatine film, but without carbon, is prepared, exposed, and developed in a somewhat similar way, but dried without being transferred to paper, the result being a sheet of gelatine with a picture in *relief*. This is laid on a plate of soft metal, and covered with a plate of steel, and the whole subjected to the action of a hydraulic press; by which the soft metal takes the impression of the gelatine film. In printing from the plate so produced, an ink, consisting of carbon and gelatine, is poured on the centre, the paper is laid on the ink, and the pressure of a suitable press applied, whereby the ink is squeezed into the shadows and half tones, and the high lights are left clean, the result being a really fine print. Glass may be used instead of paper, with very fine results.—*Lichtdruck* is a method of printing photographs in an ordinary lithographic press, with printer's ink, from gelatine films prepared on the same principle as the *Woodbury* tissue, except that the soluble gelatine is not washed away. The film is attached to a thick plate of glass fixed in the press; and when sponged over, the soluble parts absorb water, and so cannot take on ink, while the insoluble portions remain dry, and the ink adheres to them.

POSITIVISM.

POSITIVISM, *pŏz'ĭ-tĭv-ĭzm:* system of thought and life founded by Auguste Comte (q.v.); defined by him as consisting essentially of a 'philosophy and a polity which can never be dissevered; the former being the basis, and the latter the end, of one comprehensive system, in which our intellectual faculties and our social sympathies are brought into close correlation with each other.' He chose the word *Positive* on the ground of its indicating the *reality* and *constructive tendency* which he claimed for the doctrine in its theoretical aspect; while he anticipated that in the future the term would acquire a wider meaning by suggesting similar ideas in the sphere of feeling and action. The two primary characters of P., the philosophy and the polity, were finally welded into a whole under the conception of a religion, which has for its creed the new synthesis established by the one, and for its practice the scheme of moral and social reorganization proposed by the other. P. is to be considered under these three aspects.

Positive Philosophy.—Comte's primary aim was to put an end to what he deemed the intellectual and social anarchy which had resulted from the destructive criticism and the revolutionary upheaval of the 18th c., by supplying an interpretation of phenomena which should organize our knowledge of the world, of man, of society, into a consistent whole. Such a universal synthesis must the new philosophy provide, to form a sure basis for a new art of life. From the unequalled vastness of the work which Comte thus undertook, it is evident that, whatever may have been his weaknesses, none of them could have been the result of any lack of confidence in his own powers.

Historical analysis revealed to Comte, as a law of mental growth, the progress of all human conceptions through three distinct phases. The primitive stage he called the *theological;* the transition stage, the *metaphysical;* and the final stage, the *positive.* The meanings which he attaches to these words are concisely explained by Stuart Mill's translation of them into volitional, abstractional, experiential (see COMTE). The transition was effected by the gradual acceptance of the scientific method of induction from observation of phenomena as the only sound basis of explanation, all inquiry into causes other than phenomenal being finally given up as fruitless. Science, therefore, is the instrument capable of effecting the desired unity; and the problem of the positive philosophy is a three-fold one: (1) To bring all knowledge within the sphere of scientific investigation; (2) To extend scientific methods through the whole territory of each division; (3) To co-ordinate the results obtained from the separate sciences, so as to approach an expression of all our knowledge in terms of a single doctrine. All three parts of this problem Comte considered to be in large degree solved by his *Classification of the Sciences.*

He observed that the several classes of conceptions

advanced from the theological to the positive stage with different degrees of facility, and on inquiring into the law of progression, he found that the order of emancipation of the various sciences was determined by the degree of complexity and the consequent relations of dependence. A preliminary distinction was made between the abstract and the concrete sciences, the former treating separately of the general laws manifested by all the phenomena of any class, and the latter depending on these and treating of definite objects under the several aspects in which they may be viewed. The concrete sciences, Comte considered, did not yet admit of co-ordination, and he confined his classification to the abstract sciences, which he placed in the following series: 1. Mathematics; 2. Astronomy; 3. Physics; 4. Chemistry; 5. Biology; each of these drawing its data from the preceding science, and adding a new order of conceptions peculiar to itself. This series he found coincident with the sphere of knowledge then supposed to admit of scientific treatment. But there remained the phenomena of human character and society, forming a wide field of inquiry to which positive methods had never yet been applied. Certain tentative efforts had indeed been made to construct a so-called science of history—notably by Condorcet and St. Simon—but no one before Comte had formulated the principles on which such a task might be accomplished. By his discovery of the methods proper to a rational study of social phenomena, his dicta—that owing to the complexity of the conditions involved, the laws of such phenomena cannot be determined *a priori*, but must be inductively observed, and afterward verified and coordinated by deductive application of the general laws of life; that the statical condition of each historical period must be viewed in its totality, as determined by the interaction of the various classes of social factors; that intellectual evolution affords the true measure of social progress;—by his enunciation of these and other doctrines, he sought to create Sociology, which he claimed to have established in the hierarchy as the last and crowning science of the series.

The whole realm of fact was now included in the domain of positive inquiry, and Comte next addressed himself to the task of rationalizing the separate departments of knowledge. In the earlier portion of this task, his mathematical aptitude insured him a measure of success; while in biology he opened the way for further developments by his organization of the materials then available. His main services, however, in scientific coordination are thought to have been in the department of sociology. Besides the formal constitution which he gave to the new science, his chief substantive contribution was his enunciation of the fundamental law of intellectual development, above referred to as the cardinal doctrine of the positive philosophy. The progress of thought, moreover, from theological to positive con-

ceptions, was regarded by him as historically coincident with a progression in social action from an aggressive militarism, through a period of defensive attitude to the final régime of industrialism. The two series of transitions are mutually dependent, our increasing knowledge of the conditions of our existence, and our systematic efforts to modify them, naturally reacting on each other.

The main problem of the positive philosophy, the unification of knowledge, was not yet ripe for its final solution in the days of Comte, but his classification of the sciences is regarded by his followers as affording an admirable framework for the theory of evolution advanced at a later date with the claim of supplying this want; and the support may probably be considered adequate to the weight of the material. Comte was fain to be content with the demonstration of a subjective unity in the subservience of all the sciences to the needs of man.

Positive Polity.—On the basis of the philosophy that he had thus established, Comte founded a scheme of individual and social conduct. The ethical portion he did not live to complete, but in his elaborate exposition of the art of social polities, we have ample insight into his views on what he considered an integral part of his system. We have space here for only a bare outline of his theory.

The most complete life must be that which rests on the fullest knowledge. We naturally strive to improve those conditions of our existence which we can effect, in the direction indicated by the clearer light of a new synthesis. What, then, are the evils or imperfections of our lot which may be remedied by applying positive philosophy to life? Cosmical laws are wholly beyond our direct influence, and we can only to a limited extent affect the conditions of their action. But in the science of man we ourselves are the factors, and our efforts to modify our environment form the subjective aspect of what is, objectively considered, a law of social development.

Comte believed the first requisite of systematic action to be the recognition of a central intellectual and moral authority dissociated from practical politics, which he proposed to secure by organizing a *Spiritual Power*, consisting of philosophers, supported by the state. This class, exerting a purely *moral* control, yet supreme in all affairs of private and social life in virtue of its natural prestige, would have only an indirect influence on political action. The temporal power should be in the hands of capitalists, the captains of industry—chosen by their own order and naming their successors—who would feel a moral responsibility to the spiritual power, especially when the authority of the thinkers should be strengthened by the support of women and of the working classes, whose ready adherence to positive principles Comte firmly anticipated

Besides the corrective influence of each of these powers on the other, an efficient check on despotic control on the part of either is provided in the perfect freedom of opinion and expression allowed—a freedom the more valuable in that it would rest on a system of scientific and moral education, which it would be one of the chief functions of the spiritual power to direct and enforce.

With the decline of militarism and the growth of industrialism, Comte foresaw that political action would in the future be directed mainly on organization of labor for the benefit of society at large. No idleness would be permitted; all would be workers. The distinction between the capitalists and the workmen, the rich and the relatively poor, would remain; but the former would be taught to hold their wealth and power as in trust from society to be used for the benefit of all, while the latter also would come to regard themselves as performing public functions, serving society each in his place. These views are substantially similar to such more recent economic teaching as that of Carlyle and Ruskin.

In the sphere of morals, the main office of the spiritual power would be to strengthen the social tendencies of man at the expense of the personal, a process made possible by the development of the affections called forth originally in family life. In the sphere of intellect, it should regulate and concentrate the labors of its members, putting an end to the present 'dispersive specialty' of scientific aims, and determining the direction of all intellectual efforts by reference to social needs. In pursuance of the constructive principle of P., Comte applies these general doctrines to the immediate future, by propounding a scheme of concerted action in Europe for a great Western Republic, embracing the French, English, German, Italian, and Spanish nations—heretofore imperfectly organized by the influence of Feudalism and Christianity.

Positivist Religion.—Beside the creed and the practice of P., a religion is requisite: there must be a sentiment, an appeal to the heart, a satisfaction of the feelings. The conception of an object of love and reverence proposed by Comte to succeed the idea of a Deity (whose existence he considered it impossible either to affirm or deny), is that of *Humanity* regarded as a collective unity, a *great being*, consisting of all the men and women past, present, and to come, whose lives have been or shall be devoted to the well-being and progress of the race. This being, partly ideal yet wholly real, capable of being definitely conceived, and not beyond the reach of our services, would gather round it all our affections for our fellow-men; gratitude and reverence for those whose struggles and achievements in the past have made us what we are; love and sympathy for all around us who are striving after better things; hope and effort for the more perfect life of those yet unborn. Comte looked on the religion of humanity as fulfilling all the highest aims sought by the religions of the past, and especially

as succeeding naturally to Christianity, the historical value of which he thoroughly accepted as a transitional phase of religious development. The worship of humanity was to consist in prayer, taking the form of high resolve strengthened by effort after ideal communion with the noble spirits among the dead; and in public commemorations, for the observance of which a calendar was suggested, associating each day of the year with some great name in the roll of mankind, and arranged to illustrate the course of human progress. The spiritual power would carry on the traditions of the priesthoods of former religions, preaching self-abnegation as the rule of life bringing the highest happiness, and offering no reward, save a place in the 'choir invisible' of the great and good, whose names are cherished in the hearts of those who follow them, and whose influence will live to the end of time.

Positivism is of too recent origin to be adequately treated except in an account of its genesis, and the above outline of the system has therefore been confined to the works of its founder. In his lifetime, Comte attached to himself a small body of disciples noted for intellectual eminence. The most prominent was Littré (q.v.) who afterward edited his master's works, and who established a review, *La Philosophie Positive.* His discipleship, however, did not extend to the later developments of the system. Near the end of his life, Comte founded the Positivist Society. The organization has had its headquarters in Paris, but it has extended to other countries, and the number of adherents is claimed to be slowly increasing. Among the best known English Positivists are Dr. Congreve, Frederic Harrison, Dr. Bridges, and Prof. Beesly.

Among sympathetic critics of Positivism are many thinkers of eminence imbued with the positive spirit, who have more or less been stimulated by Comte. Stuart Mill, in *Auguste Comte and Positivism,* though taking an independent stand, speaks in terms of high appreciation not only of the leading doctrines of the positive philosophy, but also of the conception of humanity as a *Grand Etre,* which is the keystone of the new religion. Many of the details of ritual and worship, however, were repugnant to him, as they have proved to many; and while exaggerating the importance of these, he makes an arbitrary separation between the earlier and the later portions of Comte's career. With his book should be read Dr. Bridge's reply, *The Unity of Comte's Life and Doctrines.* Herbert Spencer, though he may be regarded as owing much to Comte, has been more careful to vindicate his independence than to acknowledge his obligation: his references to his predecessor mostly concern their disagreements. In two essays, *The Genesis of Science,* and *The Classification of the Sciences,* he opposes Comte's views on these subjects—not to the satisfaction of other

competent critics—and he has published an article entitled *Reasons for Dissenting from the Philosophy of M. Comte.* Spencer's exposition of the theory of evolution is regarded by Positivits as a valuable contribution to that scientific philosophy, the inauguration of which they claim for their master. George H. Lewes, in the chapter on Comte in *History of Philosophy,* enthusiastically calls him the greatest thinker of modern times, and declares himself an ardent adherent of the positive philosophy; though for the religious aspects of Positivism, Lewes's feeling is one of only partial sympathy. In 'George Eliot's' works, the influence of Comte's doctrines is evident, and one of her best known poems is an interpretation of the positivist conception of immortality.

POSOLOGY, n. *pō-zŏl'ŏ-jĭ* [Gr. *posos,* how much; *logos,* discourse]: the branch of medicine which treats of quantity of doses. POSOLOGICAL, a. *pō'zō-lŏj'ĭ-kăl,* of or pertaining to quantities or doses in medicine.

POSSE, n. *pŏs'sĕ* [L. *possĕ,* to be able—the first word of *possĕ comĭtātus,* number of persons able to attend]: the civil power of a county that may be called to attend a sheriff or other peace officer in the execution of justice or for preservation of the public peace: familiarly, a number or crowd of persons, as of the police. In case of forcible resistance, the peace officer may command the assistance of all or any persons as requisite, and it is an indictable offense for any to refuse; but certain persons are exempt, not being considered a part of the power of the county—e.g., women, minors under the age of 15, etc.

POSSESS, v. *pŏz-zĕs'* [L. *possessus*—from *possidērĕ,* to have and hold, to be master of: It. *possedere:* F. *posséder*]: to have or hold as an owner; to enjoy; to occupy; to hold the title of, as the rightful proprietor; to have power over, or to affect by some invisible power; in *OE.,* to acquaint; inform. POSSES'SING, imp. POSSESSED', pp. *-zĕst'.* POSSES'SOR, n. *-sẽr,* one who possesses; the owner. POSSES'SION, n. *-zĕsh'ŭn* [F.—L.]: state of owning or having in one's own power; that which is possessed; occupancy; property (see POSSESSION): state of being under the power of invisible beings; madness. POSSES'SIVE, a. *-zĕs'sĭv* [F. *possessif*—from L. *possessīvus*]: having possession; in *gram.,* denoting the genitive case in nouns; in *Eng. gram.,* when one noun possesses another it is said to be in the possessive case, and terminates in the mark *'s* or *'*. POSSES'SIVELY, ad. *-lĭ.* POSSES'SORY, a. *-sẽr-ĭ,* having possession. TO POSSESS WITH, to furnish or fill with. TO GIVE POSSESSION, to put in another's power or occupancy. TO TAKE POSSESSION, to bring within one's power or occupancy; to enter on. WRIT OF POSSESSION, the written order of a court of law directing a sheriff to put a person into possession of property recovered by legal process.—SYN. of 'possess': to have; hold; own; enjoy; occupy; seize; control;—of

'possessor': owner; master; holder; occupant; proprietor.

POSSESSION: the detention and enjoyment of a thing which one holds and exercises by oneself or through another in his name. There are two requisites to complete possession: first, occupancy, and second, the taking with intent to possess,—hence persons who are without legal wills—as children, idiots, etc., cannot acquire possession; however, a child of sufficient understanding may legally acquire possession of a thing.

One is said to be in actual possession when the thing is in immediate occupancy, and constructive possession when one claims to hold by virtue of a title without actual occupancy; possession may be enjoyed by the proprietor of a thing—thus the proprietor of a house possessing it by his tenant.

To acquire possession of a property it is requisite that there be intention of possessing as owner, and also the possession of the thing.

Possession is lost when one transfers a property to another with the intention of divesting himself of the title, or when he does some act which manifests his intention of abandoning possession. Though, of course, no proof of ownership or title to property or a thing, the possession is a fact in evidence of it, and it is sufficient evidence against anyone who cannot show a better claim.

Continuous possession of land for a time, which varies in the statutes of various jurisdictions, usually 20 years, will give the occupant title by adverse possession.

POSSESSION THEORY: a superstitious belief or theory prevailing among races and individuals of low culture that disease, whether bodily or mental, is due to the presence of a malevolent spirit.

POSSET, n. *pŏs'sĕt* [OF. *posque*—from L. *posca,* a drink of vinegar and water: perhaps also connected with W. *posel,* curdled milk: comp. Ir. *pusoid,* a posset]: dietetic preparation, made by curdling milk with some acidulous liquor, e.g., wine, ale, or vinegar. White wine or sherry is usually preferred, but sometimes old ale is used. The milk is boiled; and while it is still on the fire, the acidulous matter is added; if sherry, about a wineglassful and a half to the pint of new milk is the proportion; or twice the quantity if ale. A teaspoonful of vinegar or of lemon-juice is sometimes used instead; one or two tablespoonfuls of treacle are added, to sweeten. It is taken at bedtime for colds and coughs. POSSET, v. in *OE.,* to curdle, as milk with acids; to turn.

POSSIBLE, a. *pŏs'sĭ-bl* [F. *possible*—from L. *possĭbĭlis,* that may be done—from *possĕ,* to be able: It. *possibile*]: that may happen; that can be done; barely able to come to pass; practicable; not contrary to the nature of things; feasible. POS'SIBLY, ad. *-blĭ,* by any power really existing; perhaps; peradventure; perchance. POS'SIBIL'ITY, n. *-bĭl'ĭ-tĭ* [F. *possibilité*]: the state of being

possible; the power of being or existing; that which is possible; a contingency.

POST, n. *pōst* [F. *poste*, a post or place, a station, relays of horses—from mid. L. *posta*, a station: L. *postis*, a doorpost; *positus*, placed; *pōno*, I place]: a piece of timber placed upright, generally as a support for something else; a station for soldiers, and also the soldiers stationed at it; in *mil.*, a bugle sound or call; a place or situation; the station of duty; employment; a messenger who carries letters regularly from place to place; a quick or speedy manner of traveling (see POSTING): the post-office; the mail; a size of printing and writing paper; a miner's or quarryman's term for any compact stratum of sandstone or limestone: V. to travel with speed, as by relays of horses; to send with speed; to place; to station; to fix; to assign; to advertise by putting a placard on a wall or a post; to expose to public shame, as a defaulter; to place letters in the postoffice; in *book-keeping*, to carry the entries from other books to the ledger: ADJ. speedy, as by post: AD. in haste; hastily. POST'ING, imp.: ADJ. traveling with speed (see below): relating to an establishment where post-chaises and post-horses can be obtained on hire. POST'ER, n. *-ėr*, one who posts; a courier; a large printed bill for posting. POST'ED, pp. POST'AGE, n. *-āj*, the money paid for the conveyance of letters by post. POST'AL, a. *-ăl*, relating to posting or mails. POST-BAG, a mail-bag. POST-BOY, a courier; a boy or man who rides the horse, or one of the horses of a post-chaise. POST-CHAISE, a carriage for conveying travellers from one place to another for hire. POST-HASTE, with speed. POST-HORSE, a horse stationed for the use of couriers. POST-HOUSE, a house where relays of horses are kept. POSTMAN, a letter-carrier. POSTMARK, the stamp of a post-office on a letter. POSTMASTER, one who has the superintendence and direction of a post-office. POSTMASTER-GENERAL, the chief executive head of everything connected with the national postal system; in the United States, a member of the cabinet, and occasionally so in Britain. POST-OFFICE, office where letters are received for transmission to various parts, and from which letters are delivered that have been received (see below). POST-OFFICE DIRECTORY, in British towns, a book containing the names of the inhabitants, with their residences, trades, occupations, or professions, together with a variety of other useful and postal information. POST-OFFICE ORDER: see MONEY-ORDER, under MONEY. POST-PAID, a. having the price for the carriage of the letter paid in advance, usually in the form of a stamp on the letter itself. POST PAPER, letter-paper of a large size. POST-TOWN, a town having a regular post-office. POSTAGE-STAMP, an adhesive govt. stamp, of different values, for affixing to letters or parcels to be sent by post. FROM PILLAR TO POST, to and fro; from one position to another. KNIGHT OF THE POST, one who gains

his living by false evidence; a sharper. POSTED UP IN A SUBJECT, thoroughly well informed about it.

POST-, *pōst* [L. *post*, behind, after]: a common prefix, signifying 'behind; after; afterward; subsequent.'

POST, ALFRED CHARLES, M.D., LL.D.: surgeon: 1806, Jan. 13—1886, Feb. 7; b. New York; nephew of Wright Post, M.D. He graduated at Columbia College 1822, studied medicine with his uncle, graduated at the College of Physicians and Surgeons 1827, and applied himself chiefly to surgery in New York. He was demonstrator of anatomy in the College of Physicians and Surgeons 1831-35; professor of surgery in the Univ. of the City of New York 1851-75 and president of its medical faculty from 1873 till his death; and was noted for his success and boldness of his operations and his skill in devising surgical apparatus. He conducted a weekly clinic at the University Medical College, in New York, for many years, was the first surgeon in the United States to perform an operation for the cure of stammering.

POST, CHARLES CYREL: American politician: b. Shiawassee, Mich., 1846, May 16. He studied at Hiram and Oberlin colleges, Ohio; was admitted to the bar in 1874, but did not practice and soon took up journalism. He was prominent in the Greenback movement and furthered the Anti-Monopoly movement whose supporters nominated Gen. Butler for president. He removed to Georgia in 1885 and to Florida in 1892, and in 1899 founded the School of Scientific Philosophic and Psychic Research. He has published: *Metaphysical Essays* (1896); *Men and Gods* (1898); *From Wabash to Rio Grande* (1880); etc.

POST, MELVILLE DAVISON: American lawyer and novelist: b. Harrison co., W. Va., 1871, April 19. He was graduated from the University of West Virginia and has since practiced law in Grafton, W. Va. He has published: *The Strange Schemes of Randolph Mason* (1896); *The Man of Last Resort* (1897); *Dwellers in the Hills* (1901); etc.

POST, TRUMAN MARCELLUS, D.D.: Congregational minister and scholar: 1810, June 3—1886, Dec. 31; b. Middlebury, Va. He graduated at Middlebury Coll. 1829; was principal of the Castleton Acad. 1829-30; and tutor at Middlebury 1830-32. After a course of private study in law, pursued in connection with teaching, he began practice at Jacksonville, Ill., but the same year, 1833, was elected prof. of anc. languages in Illinois Coll., situated there; subsequently, he had the chair of history. In 1840, having been licensed to preach, as the custom is with many teachers in religious colleges, he occupied the pulpit of the Congl. Church in Jacksonville; 1847, was pastor of the Third Presby. Church in St. Louis; 1851, and until his death, ministered to the First Congl. Church in the same city, meanwhile acting as prof. of history in

the Washington Univ. there, and for two years, 1873–75, giving lectures on Congl. polity and history at Andover Theol. Seminary; also, for some years, filling the chair of eccles. hist. in the Chicago Theol. Seminary. He had remarkable powers as a thinker, and much vigor and beauty of style. He was a contributor to theol. periodicals, and pub. *The Sceptical Era of Modern History* (1856).

POST, Wright, M.D.: surgeon: 1766, Feb. 19—1828, June 14; b. North Hempstead, N. Y. After studying medicine in this country and in London, he commenced practice in New York 1786. The following year he lectured at the New York Hospital, was prof of surgery in Columbia College 1792, and of anatomy 1793–1813, became prof. in the College of Physicians and Surgeons 1813, and was its pres. 1821–26. He was one of the most brilliant operative surgeons of his time, was a member of Amer. and foreign societies, and published many articles and lectures. He died at Throg's Neck, N. Y.

POSTAL INSURANCE: POSTAL SAVINGS BANKS: POSTAL SERVICE: etc.: see Post-office.

POST-DATE, v. *pōst-dāt′* [L. *post*, after, and Eng. *date*]: to date a document in advance of the real date on which it was written; †o after-date. Post-dated, a. dated in advance.

POSTDILUVIAL, a. *pōst′dĭ-lô′vĭ-ăl* [L. *post*, after; *diluv′ĭum*, the deluge]: happening after the flood of Noah. Post′dilu′vian, n. *-ăn*, one who lived after the flood, or who has lived since the deluge.

POST-ENTRY, n. *pōst-ĕn′trĭ* [L. *post*, after, and Eng. *entry*]: a second or subsequent entry.

POSTE-RESTANTE, *pōst-rĕs-tânyt′* [Fr. *poste*, post office, mail; *restante*, lying over, remaining]: in a free-delivery post-office, the dept. of letters waiting to be called for. In the United States every post-office, except the increasing number of offices having the delivery system, is a P.-R. Such a dept. is a convenience to persons travelling, whose letters can thus await them at certain points. The term is applied also to a written or printed superscription on a letter or other mail package, as an instruction to the receiving postmaster to hold the package till called for by the person addressed. In the United States and other English-speaking countries, it is preferable to write—'Keep till called for.' The time for holding unclaimed correspondence addressed 'P.-R.,' in the countries comprising the Universal Postal Union, is as follows: Costa Rica 10 days; Gr. Brit., Ger., Peru, Salvador, 1 mo. domestic, 2 mos. foreign; Netherlands W. Indies 1 mo. from Venezuela and W. Indies, 2 mos. elsewhere; Cyprus, Dominica, Montserrat, 1 mo.; Ceylon 1 mo., sea-travellers 3 mos.; Siberia 1 mo. for w. Africa, 3 mos. elsewhere; Antigua, Austria, Bahamas, Barbadoes, Bermuda, Brit. Honduras, Egypt, France, Grenada, Hungary, Italy, Paraguay, Roumania, Servia, Spain, Trinidad, St. Christopher, St. Lucia, Turk's Island, and Virgin Island, 2 mos.: Dutch Guiana 2 mos. domestic, no

limit foreign; Japan 2 mos. at receiving office, afterward indefinite at dead-letter office; Canada 2 mos. in co. offices, 1 mo. in city offices, indefinite in dead-letter office; Netherlands 6 weeks; Denmark 2 mos. from Germany, 3 mos. elsewhere; Brit. Guiana 2 mos. general, 3–4 mos. special; San Domingo 2 mos. domestic, 3 mos. foreign; Jamaica 4 weeks domestic, 8 weeks foreign; Brazil, U. S. of Colombia, Danish W. Indies, French colonies, Gambia, Gold Coast, Lagos, Greece, Luxemburg, Montenegro, Newfoundland, Norway, Persia, Switzerland, Tobago, U. S. of Ameriea, 3 mos.; Belgium till 5th of 3d mo. following arrival; Hong-Kong 3 mos., sea-travellers 4 mos.; Falkland Islands 3 mos., sailing-vessel travellers 6 mos.; Sweden generally till end of quarter following arrival, then sent to eentral office; Russia and Bulgaria 4 mos.; Brit. India 1–4 mos., aeeording to destination; Guatemala, Hawaii, Mexico, St. Vincent, Straits Settlements, Turkey, 6 mos.; Portugal 6 mos. domestic, 3 mos. foreign; Sierra Leone 6 mos., for person dead or removed from colony sooner; Netherlands E. Indies, 3 mos. at destination, then three months at central office; Chili 3 mos. destination, then 6 mos. eentral; Niearagua 6 mos. destination, then 6 mos. eentral; Argentine Republic 9 mos. destination, then 3 mos. central; Honduras, Hayti, Mauritius, Uruguay 1 yr.; Venezuela 2 yrs.; and Labuan till failure of all means to deliver.

POSTERIOR, a. *pŏs-tē′rĭ-ėr* [L. *posterĭor*, the comp. deg. of *postĕrus*, coming after]: later in time or plaee; eoming after; hinder; in *bot.*, applied to the part of the flower next the axis—same as *superior*. Poste′riorly, ad. *-lĭ*. Poste′rior′ity, n. *-ŏr′ĭ-tĭ*, state of being later or after. Poste′riors, n. *-ėrz*, the hinder parts of an animal. Posterity, n. *pŏs-tĕr′ĭ-tĭ* [F. *postérité*—from L. *postĕr′ĭtas*, futurity]: descendants; sueeeeding generations; opposed to *ancestors*.

POSTERIORI: see A Posteriori.

POSTERN, n. *pŏs′tėrn* or *pōst′ėrn* [OF. *posterle, posterne;* F. *poterne;* It. *posterla;* L. *poster′ŭla*, a baek door —from *postĕrus*, behind]: any small door or gate; a private entrance: in *fort.*, a vaulted passage (called often the *sally-port*) constructed under the mass of the parapet and through the rampart eommunicating through the flank of the bastion between the fort and the diteh. Its object is to afford unseen egress to troops marehing out to relieve sentries on the external works, or to make sudden sallies, etc.: Adj. behind; private.

POST-EXIL′IC, a.: pertaining to, occurring in, or connected with the period in Jewish history after the Babylonian captivity.

POST FACTO, *pōst făk′tō* [L. *post*, after; *factum*, an aet, a deed]: after the act has been committed; a *post facto law*, a retrospeetive law.

POSTFIX, n. *pōst′fĭks* [L. *post*, after; *fixus*, fixed]: letters, or a syllable, placed at the end of a word; an affix: V. to place behind or at the end; to plaee letters, or a syllable, at the end of a word; to affix.

POSTHUMOUS, a. *pŏst′ū-mŭs* [F. *posthume;* It. and Sp. *postumo*, posthumous—from L. *postumus*, the last, the hindmost—from *postĕrus*, coming after]: born after the death of a father, as a child; or taken from the body of a mother after her death. The law regards a P. child as already born at the time of the parent's death, and thus as entitled to such share in the parent's property under a will as it would have been entitled to had its parent lived till after its birth.—Applied to a book, the term means published after the death of an author: in general, occurring or arising after one's decease. Post′humously, ad. *-lĭ*. *Note.*—This word should be written Postumous, according to its etymology: it owes its present form to the erroneous idea that it is derived from L. *post*, after; *humus*, the ground.

POSTICOUS, a. *pŏst′ĭ-kŭs* [L. *postīcus*, hinder]: in *bot.*, applied to anthers when they open on the outer surface —same as *extrorse*, which see; opposed to *anticous*.

POSTICUM, n. *pŏst′ĭ-kŭm* [L.]: in *Rom. arch.*, part of a temple in the rear of the cell; the part in front being called pronaos.

POSTIL, n. *pŏs′tĭl* [L. *post illa*, i.e., *post illa verba*, after these words: Sp. *postila;* It. *postilla*, a postil]: a marginal note, originally in the Bible; in the *R. Cath. Chh.*, a homily read after the Gospel.

POSTILION, n. *pŏs-tĭl′yŭn* [F. *postillon*, a postilion—from It. *postiglione; posta*, a messenger (see also Post)]: the rider on the near leader in a carriage with four horses; also the rider of one horse when one pair only is used.

POSTING, *pōst′ĭng:* forwarding of passengers by means of relays of horses: also travelling by such relays. The application of the same words—post and postmaster—in connection with the transmission of letters and with the stations where post-horses are kept, is, in Europe a source of ambiguity. P. was long in Britain, as it is yet in most parts of the continent, a govt. monopoly. A statute of Edward VI. fixed the charges of P. at 1*d.* (2 cents) per mile 1548. The post-office act of 1656 confirmed the monopoly of furnishing post-horses for travellers in favour of the postmaster and his deputies. P. has now for a long time been in the hands of private individuals. Post-chaises were used first in France, and were introduced into England early in the 18th c. The payment is estimated per mile for each pair of horses, without regard to the number of persons conveyed; and a second pair of horses is charged at the same rate as the first. On the continent generally, P. is managed by the state, which retains the monopoly of supplying post-horses, and usually of forwarding the mails and diligences. The prices are fixed by govt., as well as the number of horses that may be employed, which is regulated by the weight and number of persons conveyed.

POSTIQUE, *pōs-tēk′:* ornament in sculpture, marble, etc., applied or added after the work is otherwise finished.

POSTLUDE, n. *pōst′lūd* [L. *post*, after; *ludus*, a play]. in *mus.*, a concluding voluntary; an afterpiece.

POSTMERIDIAN, n. *pōst-mĕ-rĭd′ĭ-ăn* [L. *post*, after; *meridiēs*, mid-day]: afternoon—usually contracted into P.M.: ADJ. coming after the sun has passed the meridian.

POST-MORTEM, a. *pōst-mŏr′tĕm* [L. *post*, after; *mors* or *mortem*, death]: after death; made after death: N. an examination of a body made after death.

POST-NUPTIAL, a. *pōst-nŭp′shăl* [L. *post*, after; *nuptiæ*, marriage]: being or happening after marriage. POST-NUPTIAL CONTRACT, in Scotch law, an agreement, or a settlement between husband and wife after marriage with a view to affect the property of the parties, and generally to make provision for the wife and children. See HUSBAND AND WIFE.

POST-OBIT, n. *pōst-ō′bĭt* [L. *post*, after; *obitus*, death]: bond or security given by heirs and others entitled to reversionary interests, whereby, in consideration of a sum of money presently advanced, the debtor binds himself or his estate to pay a much larger sum after the death of some person, or of himself. Whenever, as is not unusual, the payment is uncertain, and depends on the obliger outliving somebody else, very high interest is required, or rather a very much larger sum is agreed to be repaid than what is advanced. These are generally usurious bargains; but the obligee or creditor can enforce payment of the full amount; though, if there is a gross inadequacy in the proportions amounting to fraud, a court of equity will interfere.

POST-OFFICE, *pōst'ŏf-fĭs:* place for reception and transmission or delivery of letters; also the management of the various departments and functions connected with their dispatch and conveyance. The name originated in the posts or stations [from Lat. *positum*, placed, fixed] at intervals along the roads of the old Roman empire, where couriers were kept in readiness to bear dispatches and intelligence; but those were never used for conveyance of private correspondence. The first letter-post seems to have been established in the Hanse Towns in the early part of the 13th c. A line of letter-posts followed, connecting Austria with Lombardy, in the reign of Emperor Maximilian—said to have been organized by the princes of Thurn and Taxis; and the representatives of the same house established another line of posts from Vienna to Brussels, connecting the most distant parts of the dominions of Charles V. This family continue to the present day to hold certain rights relative to the German postal system, their posts being entirely distinct from those established by the crown, and sometimes in rivalry to them.

In England, in early times, both public and private letters were sent by messengers, who, in the reign of Henry III., wore the royal livery. They had to provide themselves with horses until the reign of Edward I., when posts were established where horses were to be had for hire. Edward IV., when engaged in war with Scotland, had dispatches conveyed to his camp with great speed by a system of relays of horses, which fell into disuse on restoration of peace. Camden mentions the office of 'Master of the Postes' 1581, but the duties of that officer were probably connected exclusively with the supply of post-horses. The posts were meant for the conveyance of govt. dispatches alone, and it was only by degrees that permission was extended to private individuals to make use of them. A foreign post for conveyance of letters between London and the continent seems to have been established by foreign merchants in the 15th c.; and certain disputes which arose between the Flemings and Italians, regarding the right of appointing a postmaster, and were referred to the privy-council, led to the institution of a 'chief-postmaster,' who should have charge both of the English and the foreign post. Thomas Randolph was the first chief-postmaster of England. The first proper postal communication for private letters in England came into operation 100 years after the institution of the foreign post. The increased intercourse between the English and Scottish capitals, resulting from King James's accession, led to great improvement in the system of horse-posts, but their services were still confined to conveyance of govt. dispatches. James however instituted a foreign post for letters going abroad from England, and conferred the office of postmaster of England for foreign parts on 'Mathewe de Quester the elder, and Mathewe de Quester the younger.' This appointment was considered by Lord Stanhope, the

English chief-postmaster, to interfere with his functions; and a dispute and law-plea between the heads of the two establishments were settled 1632, after Charles I. had become king, by the retirement of Lord Stanhope, and an assignment of their office by the De Questers, under royal sanction, to William Frizell and Thomas Witherings. In 1635 Witherings was authorized to run a post night and day between London and Edinburgh, 'to go thither and back again in six days.' Eight main postal lines throughout England were at the same time instituted, and the post was allowed to carry inland letters. Two years later, a monopoly of letter-carrying was established, which has been preserved in all subsequent regulations of the P.-O. The rates of postage were 2*d.* (4 cents) for a single letter for a distance less than 80 m., 4*d.* (8 cents) up to 140 m., 6*d.* (12 cents) for any longer distance in England, and 8 *d.* (16 cents) to any place in Scotland. An attempt, 1649, by the common council of London to set up a rival P.-O. for inland letters, was suppressed by the house of commons. A practice of farming the P.-O. revenues, which began 1650, continued, as regards some of the by-posts, till the close of the 18th century.

An important P.-O. statute was passed under Oliver Cromwell's Protectorate 1656, and re-enacted after the restoration of the monarchy. It ruled that there should be one general post-office and one postmaster-gen. for England, who was to have the horsing of all through posts and persons riding post. A tariff was established for letters, English, Scotch, Irish, and foreign; and the only non-governmental posts allowed to continue were those of the universities and the Cinque Ports.

In 1685, a penny-post was set up for the conveyance of letters and parcels between different parts of London and its suburbs. It was a private speculation; and when its success became apparent, it was complained of by the Duke of York, on whom the P.-O. revenues had been settled, as an encroachment on his rights; a decision of the court of king's bench adjudged it to be a part of the royal establishment, and it was thereupon annexed to the crown. In this way began the London district-post, which was improved and made a twopenny-post 1801, and continued as a separate establishment from the general post till 1854.

The first legislative enactment for a Scottish P.-O. was passed 1695, prior to which time, the posts out of Edinburgh had been very few and irregular. About 1700, the posts between the capitals were so frequently robbed near the borders, that acts were passed both by the parliament of England and that of Scotland, making robbery of the post punishable with death and confiscation. The P.-O. of Ireland is of later date than that of Scotland. In the time of Charles I., packets between Dublin and Chester, and between Milford-Haven and Waterford, conveyed govt dispatches; and after the

Restoration, the rate of letter-postage between London and Dublin was fixed at 6*d.* (12 cents).

Under Queen Anne a general post-office was instituted in London for all the British dominions, with chief offices in Edinburgh, Dublin, New York, and other places in the American colonies, and one in the Leeward Islands. The whole was placed under the control of an officer appointed under the Great Seal, called the Postmaster-general, who was empowered to appoint deputies for the chief offices. The rates were raised; and they were raised further under George III. After much opposition from the P.-O. authorities, mail-coaches protected by armed guards were substituted 1783, for the boys on horseback, who had till then conveyed the mail.

In 1837 the P.-O. was revolutionized according to a plan of Mr. (afterwards Sir) Rowland Hill, whose three principal features were the adoption of a uniform and low rate of postage, a charge by weight, and prepayment. The change, strongly opposed by the P.-O. authorities, was eventually carried by a majority of 100 in the house of commons, and the new system came into full operation 1840, Jan. 10. Franking was entirely abolished. A penny (2 cents) was adopted as the uniform rate for every inland letter not above an ounce. Facilities for prepayment were afforded by introduction of postage-stamps, and double postage was levied on letters not prepaid. Arrangements were made for the registration of letters; and the money-order office, by a reduction of the commission charged for orders, became available to an extent which it had never been before since its establishment 1792. The whole new plan brought enormous increase in correspondence, and has ever since been recognized as a public benefit of high order.

With the development of the railway system came the carriage of letters by train instead of by mail-coaches; and the adoption of travelling post-offices, forming part of the mail-train, where letters are arranged during transit, and which sometimes receive and drop the letter-bags while the train is going at full speed.

The latest report officially issued by the British government shows that the total number of post-offices in the British Empire at the end of March, 1904, was 22,850. There were 37,521 road and pillar boxes. The aggregate of persons employed is given as 146,760 males and 39,262 females. Of these, 81,865 are in established offices, 11,092 being women. Included in the aggregate is an unestablished list of 106,166, of whom 28,170 are women.

The number of letters passing through the departments in 1900 was 1,812 millions; in 1904, 2,597 millions. In the year 1903-4 there were mailed 517 millions of postal cards, also 693 millions of book packages, 134 millions of newspapers, and 78 millions of parcels.

The total receipts of the British post-offices in 1900

amounted to £13,394,335; 1904, £15,824,394. The expenditures for 1900 were £9,683,999; 1904, £11,180,807.

The postal service of the three kingdoms is under the immediate control of the postmaster-gen., assisted by the general sec. of the P.-O. in London. There are also chief officers in Edinburgh and Dublin, with secretarial and other departmental staffs. The postmaster-gen. is a member of the privy-council, sometimes a cabinet minister, has a salary of £2,500, and is the only officer connected with the dept. who leaves office on a change of govt. The sec. is his responsible adviser, and has a salary of £2,000. The receiver and accountant-gen. keeps account of the money received by each dept., receiving remittances from branch and provincial offices, and taking charge of the payment of all salaries, pensions, and items of current expenditure. The surveyors are the connecting link between the metropolitan and provincial offices, each postmaster, with some exceptions, being under the superintendence of the surveyor of his district.

Postal Savings Banks.—There is a system of savings banks in connection with the British P.-O. The rate of interest payable to depositors is 2½ per cent., calculated on complete pounds and complete months, being a half-penny per pound per month. In 1900 the total deposits aggregated £122,365,193. A novel extension of this system took place in 1890. Blank forms, with twelve ruled spaces, are now issued to intending depositors, who may secure their penny savings by affixing ordinary postage-stamps to the form. When the twelve spaces are filled, the form is presented at the bank, and credit is given for a shilling. The Savings-bank Act (1880) permits the investment of small sums in government stocks; in Consols, Reduced, or New 3 Per Cents. The sums invested must not be less than £10, and must not exceed £50 in any one year; total sum for any one investor limited to £200.

Postal Telegraph.—The govt. acquired the telegraph property of various private companies 1870, and established a special bureau of postal telegraphy in the P.-O. dept.—The charge for the transmission of messages by telegraph throughout the United Kingdom was originally 1*s.* for the first twenty words, and 3*d.* for each additional five words, or part of five words; but 1885 the rate for ordinary messages was reduced to ½*d.* a word, including address. Press telegrams cost 1*s.* for 100 words by day, and for 75 by night.

In 1901 there were over 89,000,000 messages sent; the gross revenue was £3,459,353; and the working expenses were £3,812,569.

Money Orders.—Money may be transmitted to inland and foreign cities through the P.-O. by (1) postal orders, (2) money orders, and (3) telegraph money orders. The postal-order system was established 1881, money-order

1838, and telegraph money-order (for inland places) 1889. The money order system in the British Empire is one of the most perfect and successful institutions of its kind in the world, and a mighty factor in facilitating trade, both wholesale and retail. In 1900, 10 millions of inland orders were issued, valued at over 30 millions of pounds. In 1904, the total of inland orders had increased to 11 millions, with a value proportionately greater. During the same year postal orders for other places increased in value from 23 millions of pounds in 1895 to 30 millions of pounds in 1900-1. The telegraph money-order system was still in an experimental state and without official returns. The maximum amount that could be forwarded by money orders and telegraph money orders was $50, and the denominations in postal orders mostly used were 24 cts., 60 cts., $1.20 and $4.80.

The home and foreign mail-packet service is in the hands of the post-office authorities. The principal foreign contracts are for the Indian and Chinese mails, entered into with the Peninsular and Oriental Steam-navigation Company, the mails to N. and S. America, the W. Indies, the Australian colonies, and the Cape.

Postal Insurance.—Previous additions to the original P.-O. service of Great Britain had been found to work so satisfactorily—e.g., book-post, sample-post, money orders, and postal savings banks—that the legislature was encouraged to intrust to the same organization a complete system of insuring lives and granting annuities—intended specially to foster provident habits among persons whose savings can be but small.

An act of parliament 1853 improved the insurance law, by facilitating the purchase of govt. annuities through the medium of the savings banks; and in 1864 another statute gave great improvement and extension to the system. Great facilities are introduced by this act for effecting small life insurances, or for securing annuities by small payments. Not only may the National Debt Commissioners employ the trustees of savings banks to receive and pay the moneys, at a certain rate of remuneration; but the postmaster-gen. joins in the arrangement, acting as a medium between the public on the one hand and the commissioners on the other. Ample tables and regulations are printed, for guidance of the commissioners, the postmaster gen., and the local postmasters throughout the kingdom. On the completion of these tables and regulations 1865, the practical working of the system began. The tables of the premiums to be charged for life insurances, for immediate annuities, for deferred annuities, and for deferred monthly allowances, are sold by the government printers, at cost of paper and printing; and similar tables are kept for inspection at the local post-offices without charge; at these offices also the proposals for insurance may be entered. All this is of-

fered free of risk; since the credit of the nation is pledged to meet the obligation purchased by the subscription or by the payment of the contributor. All persons insuring their lives or purchasing annuities become, if not already so, savings-bank depositors, and premiums are payable through savings-bank accounts, and are deducted therefrom without trouble to depositors. Person of either sex may insure their lives with the P.-O. for any amount not less than $25 or more than $500, the limits of age being 14 years as the minimum and 65 as the maximum, or 8 years as the minimum if the amount insured does not exceed $25. Insurance for sums not exceeding $125 is granted without medical examination; but if the insurer die before the second premium becomes payable, only the amount of his first premium will be paid, and if he die before the third premium is payable, only half the sum insured becomes due to his representatives. In either case if it can be proved that the death of the insured was caused by accident, the full amount will be paid. The premiums charged for life insurance vary with the age of the person insuring, and with the mode in which they are to be paid. A life policy may be surrendered after two years' premiums have been paid; and insurers not under 16 years of age may nominate a person to whom the money due at death is to be paid.—Immediate or deferred annuities are also granted to any person not under 5 years of age for any amount not less than $5 or more than $500, and deferred annuities are granted with or without the return of the purchase money. Husband and wife may each be insured to the full amount of $500 or purchase an annuity of $500. The system of postal insurance has not met with the success anticipated.

The post-office statute of Queen Anne contains a prohibition, repeated in subsequent acts, for any person employed in the post-office to open or detain a letter, except under a warrant from one of the principal secretaries of state. During the 18th c., such warrants were often granted on very trivial pretenses. In 1723, at Bp. Atterbury's trial, copies of his letters, intercepted at the post-office, were produced in evidence against him; and 1735 it appeared that an organization existed, at immense expense, for examination of domestic and foreign correspondence. In 1782 the correspondence of Lord Temple, when lord-lieut. of Ireland, was subjected to a system of post-office espionage. In the beginning of the 19th c. new safeguards were adopted; and in the ten years 1843-53, only six letters were detained and opened —four in cases of felony, and two that they might be properly returned to those who claimed them. One such case of interference with the privacy of correspondence occurred 1844, when a warrant was issued for opening the letters of Mazzini, and certain information contained in them was conveyed to the Austrian minister—an act

which occasioned great popular animadversion: see GRAHAM, Sir JAMES.

The Universal Postal Union.—1874, Oct., a conference at Berne resulted in the establishment of the 'General Postal Union,' embracing all the European countries, with Egypt and the United States, and resulting in a great simplification of international postal arrangements. This was followed 1878, June, by the treaty of Paris, signed or subsequently adhered to by all the parties to the former treaty, with the addition of British India, the colonies of France, Spain, Holland, and Portugal, various British colonies, Persia, Japan, Liberia, Brazil, Peru, Mexico, etc., the new convention receiving the name 'Universal Postal Union.' Under this important treaty, all the consenting nations were declared 'a single postal territory for the reciprocal exchange of correspondence.' Equal rates, weights, and rules are established, and considerable reductions of postage have followed.

The Railway Post-office.—The idea of a railway post-office was first brought officially to the notice of the U. S. department by First Assistant Postmaster General Hobbie, who, in 1847, had been in Europe, and in his report gave his impressions of the travelling post-office in England. Under Postmaster-General Holt, in 1862, the first railway post-office was introduced, and from that time this service has grown. On 1905 Dec. 3, the travelling post-offices operated on 200,965 miles of railway.

UNITED STATES POST-OFFICE.—The postal history of the United States dates from the early settlement of the English in Mass. The service was conducted originally for mutual convenience and by the co-operation of the settlers. As the colony increased in numbers and sailing vessels began making regular trips between England and America, the coffee-house in Boston, which was the general rendezvous for the narration and discussion of the news of the day, was naturally selected as the place of deposit and delivery of letters and packages to and from Europe. The first attempt to organize the service legally and systematically was made by the general court of Mass. 1639, when it designated Richard Fairbanks of Boston as agent to receive and deliver all letters, and authorized him to collect one penny for every letter handled by him. In 1657 the colony of Va. enacted a law requiring 'every planter to provide a messenger to convey the dispatches, as they arrived, to the next plantation, and so on' till they reached their destination, 'on pain of forfeiting a hogshead of tobacco for default.' Inter-colonial methods of forwarding communications soon followed. In 1672 a monthly service between New York and Boston was established by the colony of N. Y.; 1673 the general court of Mass. ordered that dispatch messengers be paid at the rate of 3*d.* per M.; 1677 the same authority appointed John

Haywood to receive and distribute foreign letters arriving in Boston; and 1680 he became postmaster for the entire colony. Further inland, William Penn established a general office in Philadelphia 1683, and organized a weekly service between that city and several points in Md.; and the colony of N. H. established a service 1693. These acts all were colonial in conception and management, absolutely independent of the postal system of Great Britain. But 1660 the British parliament passed a bill to systematize and regulate postal communication with the colonies, under which Thomas Neale was recognized as royal postal agent in Va. 1692, and in N. H. 1693. In 1704 the office of royal deputy postmaster-gen. in America was created, and 1710 New York was made the American headquarters of the consolidated postal service of Great Britain. Rates of postage for the colonies were established by parliament during the reign of Queen Anne. Benjamin Franklin was appointed postmaster at Philadelphia 1737, and was commissioned deputy postmaster-gen. for the colonies 1753. He may be justly styled the father of the American postal system. Under his administration were inaugurated the delivery of mail matter at the residences of persons addressed, advertising of unclaimed letters in newspapers, tri-weekly mail between New York and Philadelphia, and weekly mail the year round between Philadelphia and New England, and the stage mail service. In 1774 Franklin was dismissed from his office, and in the following year the continental congress created a post-office dept., established post-routes from Falmouth, Me., to Savannah, Ga., and appointed Franklin postmaster-gen.; though by reason of his diplomatic service abroad, his son-in-law, Richard Bache, was subsequently appointed to the office. In 1789 the control of the entire system passed from the continental to the constitutional govt., and by act of congress 1794, May 8, the post-office dept. was established as one of the executive branches of the govt. Nine rates of postage, all comparatively excessive, fixed by law 1792, were maintained nearly 50 years. The first postmaster-gen. of the reorganized dept. was Samuel Osgood, appointed 1789, Sep. 26.

Rates of Postage.—(1891), postal cards 1 ct.; letters 2 cts. per oz. or fraction thereof; second-class matter or regular publications 1 ct. per lb.; third-class matter or transient publications and all other kinds of printed matter 1. ct. for each 2 oz.; fourth-class or merchandise 1 ct. per ounce. Foreign postage to countries in Universal Postal Union postal cards 2 cts.; letters 5 cts. per $\frac{1}{2}$ oz.; printed matter 1 ct. for every 2 oz.; merchandise samples, less than 4 oz., 2 cts., more than 4 oz., 1 ct. for every 2 oz. Double rates are charged for non-prepaid foreign letters, and a fee of 10 cts. for registering letters or other articles. Congress has given special franking privileges for life to the widows of ex-presidents of the United States. All public documents printed by

order of congress may be sent through the mail free by U. S. senators, representatives, terr. delegates, sec. of the senate, and clerk of the house; and agricultural reports and seeds, and publications of the Smithsonian Institution, also may be sent free on proper indorsement.

General Service.—The report of the postmaster-gen. for the year ending 1902, June 30, showed star, regulation wagon, special office, mail messenger, steamboat, railroad, ry. post-office car, electric and cable car services; total length, 507,540.53 m. annual rate of expenditure, $48,457,278; miles traveled per annum 574,234,687; presidential post-offices, 4,731; 4th class, 71,193; total, 75,924; ordinary revenue, $119,958,229; receipts from money-order business, $1,889,817; total receipts, $121,848,047; total expenditures, $124,785,697; excess of expenditures over receipts, $2,937,649; estimated revenue for 1903, $132,814,371; revenue from sales of stamps, stamped envelopes, newspaper wrappers, and postal cards, $112,187,120; second-class postage (pound rates), paid in money, $4,541,523; from unclaimed dead letters, $18,429.79.

Free Delivery Offices.—The number of free-delivery offices was 933; carriers, 17,785; gross receipts, $83,330,812; expenditures, $17,123,360.

Railway Mail Service.—During the year mail service was in operation on 1,350 lines of all kinds (including 146 full railway post-office lines), and the number of employees aggregated 9,731; miles of railroad covered by full railway post-office lines, 49,587; by apartment railway post-office lines, 115,577; by electric and cable car lines, 330; by steamboat lines, 13,300; other service brought the total up to 323,166,767 m. There were used 3,892 whole cars and compartments; 8,177,531,240 pieces of first-class matter were handled; 6,885,299,400 pieces of other matter and 24,174,174 packages and cases of registered matter; expenditure, $10,264,588.

Registration.—The total of letters and parcels registered was: domestic letters, 14,930,270, foreign, 2,705,801 (total 17,636,071); domestic parcels, 2,705,801, foreign, 267,056 (2,972,857); free, 3,203,257; total, 22,831,400; fees, $1,570,251.44.

Special Delivery.—Letters and parcels bearing special delivery stamp (10 cts.), in addition to regular postage, are sent out on arrival at free delivery offices by special carriers. During the year 7,762,685 letters bearing the special delivery stamp, 6,786,221 of which were credited to free delivery offices, were delivered to addresses as soon as possible after arrival or deposit.

Postal Money Orders.—There were 31,680 offices authorized to issue and pay domestic money orders and 4,456 international offices; number of domestic orders issued (including those payable in Canada, Cuba, the Philippines, etc.) 40,702,788, amount, $317,985,307; international orders, 1,311,111, amount, $22,974,473; domestic orders paid (including Canada, Cuba, the Philip-

pines, etc.), 40,722,954, amount, $320,722,919; international orders, 307,679, amount, $5,821,729. The rates for domestic money orders are as follows: for sums not exceeding $2.50, 3 cts.; over $2.50 to $5, 5 cts.: over $5 to $10, 8 cts.; over $10 to $20, 10 cts.: over $20 to $30, 12 cts.; over $30 to $40, 15 cts.; over $40 to $50, 18 cts.; over $50 to $60, 20 cts.; over $60 to $75, 25 cts.; over $75 to $100, 30 cts.

Rural Free Delivery.—Cities of 10,000 population or $10,000 gross postal receipts receive a free delivery service at least twice a day. Residents of remote rural districts to which the rural service has been extended have a free delivery of mail brought within reach of them once a day.

Nixies.—This name is applied to pieces of mail matter so illegibly addressed as to require special attention before delivery can be effected or which cannot be delivered at all. In 1902 the number was 10,954,437, of which 6,223,103 were returned to the sender, 2,187,151 were held for postage, 4,597,948 were corrected and forwarded, 835,189 were sent to the Dead Letter Office and 6,111,046 were disposed of as waste.

Postal Material Issued.—The various articles aggregated in number 6,061,456,127, value $112,665,553, and comprised 4,360,335 ordinary postage-stamps, value $83,223,506; 8,701,750 special delivery stamps, $870,175; 24,043,290 postage-due stamps, $642,621, 268,537,500 plain stamped envelopes, $5,232,636; 545,062,000 request stamped envelopes, $11,336,196; 39,528,500 newspaper wrappers, $460,966; 124,468,488 postage stamps in stamp books, $2,489,369; 547,204,090 postal cards, $5,591,636.

Foreign Mails.—In 1901-2 the Department paid for the transmission of foreign mails, $2,245,625. The United States received 55,184,754 letters, 2,974,270 post cards, and 37,075,890 prints and commercial papers, and dispatched 74,289,116 letters, 3,821,296 post cards, and 72,389,164 prints and commercial papers. The weight of the parcels-post mails dispatched was 322,615 lbs., of which 65,616 were for Germany. On 1891, Mar. 2, the senate adopted the postal subsidy bill passed by the house to promote transportation of mail matter by American ocean steamships. See DEAD-LETTER OFFICE: FRANK, POSTAL: POSTE-RESTANTE.

POST-OFFICE, OFFENSES AGAINST THE: offenses which, because of the conspicuous part which the post-office plays in modern civilization, have been made the subject of national legislation. The code of laws for the U. S. post-office, which is very voluminous and detailed, is contained in a special govt. publication, *Postal Laws and Regulations*, which may be consulted by the public at any large post-office. Beside this, an official *Postal Guide* is revised and published monthly and annually, which gives the latest laws, amendments, and instructions to postal officers. In the United States, as elsewhere, the most stringent laws are those for the preservation of the secrecy of the mails. Their substance is:

'No person employed in any department of the postal service shall under any circumstances break the seal of any letter or parcel for the purpose of ascertaining the character of its contents.' The only exception is in the Dead-letter Office (q.v.), where an officer is specially authorized to open a letter or parcel solely for the purpose of ascertaining the name and address of the writer, that the letter or parcel may be returned. This law is so rigidly enforced that even in the other stringent ones, prohibiting the use of the mails to persons dealing in counterfeit money or engaged in lottery schemes of any character, its provisions are invariably reiterated. A postmaster who *knows* that a letter or parcel contains counterfeit money, lottery tickets, or circulars about either, must seize the letter or parcel and withhold it from transmission or delivery; but he must not open a suspected letter or parcel to ascertain if it contains prohibited or other unmailable matter. No person nor corporation may engage in the regular transmission of letters, locally or for long distances, for rate payments. The writing or printing on the outside of envelopes and parcel wrappers of obscene, scurrilous, libelous, or threatening terms or epithets, is an offense punishable by fine and imprisonment; and the mailing, even under cover, of any obscene book, pamphlet, picture, or circular, is also prohibited. It is also an offense to attempt to evade proper postage on any letter or parcel; to wash a canceled stamp by any process for second use; to attempt to use a second time a stamp once canceled; or to use a penalty envelope, issued by the government for a free answer or acknowledgment to a communication on official business, for any private purpose.

POSTPONE, v. *pōst-pōn'* [L. *post*, after; *ponĕrĕ*, to put or place]: to put off to a future or later time; to adjourn; to delay; to set below in value. POSTPON'ING, imp. POSTPONED', pp. *-pōnd'*. POSTPON'ER, n. *-ẽr*, one who postpones. POSTPONE'MENT, n. *-mĕnt*, the act of deferring to a future time; temporary delay.—SYN. of 'postpone': to defer; delay; put off; procrastinate; adjourn; retard; hinder.

POST-POSITIVE, a. *pōst-pŏz'ĭ-tĭv* [L. *post*, after; *posĭtus*, put or placed]: in *gram.*, placed after a word. POST-POSITION n. *pōst'pō-zĭsh'ŭn*, in *gram.*, a word or particle placed after or at the end of a word, and which shows the relation it bears to another word in the sentence—distinguished from *preposition*, which regards the word or particle when it comes before. POST'POSI'TIONAL, a. *-ăl*, pertaining to a post-position.

POST-PRANDIAL, a. *pōst-prăn'dĭ-ăl* [L. *post*, after; *prandĭŭm*, a meal]: occurring after dinner.

POST-RENAISSANCE PAINTING: painting as practiced in Europe after the middle of the 15th century.

Seventeenth Century.—The great color school of mon-

umental and decorative painting which was the glory of Venice was one of the last to disappear (see RENAISSANCE PAINTING). Paris Bordone, a pupil of Titian, did little to maintain it, but a much more vigorous and original talent was that of Giacomo Robusti (1518-94), called Il Tintoretto from his father's occupation as a dyer, and also surnamed Il Furioso from his manner of working. The number of his paintings was very great, and their merit very unequal. From the school of Verona, which had been for some time rising in importance, and even in the 15th century had produced some painters of note, came another illustrious artist to add to the fame of Venice, Paolo Cagliari, called Paolo Veronese (1532-88), one of the most brilliant of all decorative painters. The school of Bologna was founded by Lodovico Carracci, aided by his two cousins, Agostino and Annibale, in 1589, at the period of the rise of the Eclectic school, protesting against the Mannerists, and of the *naturalisti*, rejecting all tradition and professing to study nature directly. In Naples appeared an Hispano-Neopolitan school, of which the chief was Jusepe Ribera, called Lo Spagnoletto. Spain produced a number of native painters in the 15th, and at the beginning of the 16th century; and the influence of Italian art became more predominant toward the middle and at the close of the latter. But the authority of the Inquisition was strongly restrictive. Francisco de Zurbaran (1598-1662?) was preëminently a painter of monks. The three great names in Spanish art are Alonzo Cano (1601-67), a pupil of Francisco Pancheco, the master and also the father-in-law of Velasquez; Diego Rodriguez de Silva y Velasquez (1599-1660); and Bartolome Estéban Murillo (1618-82). The name of Velasquez has been raised by modern criticism to the summit of the art of painting. In Germany, no painter attained the eminence of Dürer and Holbein for more than two centuries; after them, a baleful imitation of the mannerisms of the Italians suppressed any assertion of national individuality, and the so-called inspiration from Michelangelo affected even foreign painters visiting Germany,—as the Hollanders Goltzius, Hubert and Hendrick. The works of Adam Elzheimer (1587-1620), though he visited Italy and died in Rome, displayed a curious and original talent, both in figures and landscape, unusual at this period.

But it was to the Netherlands that the chief seat of the art of painting was transferred in the 17th century, made illustrious by the great development of all the resources of the art; the influence of Peter Paul Rubens (1577-1640) not only revolutionized the schools of painting of his era but is still felt in those of our day. One of the most celebrated of his pupils was Anton Van Dyck (1599-1641), whose portraits constitute his chief title of eminence; another was David Teniers the elder (1582-1649), instructor of his still more famous son of

the same name. In the works of the latter, and of a number of the painters of Holland, Adrian Brauwer, Adrian Van Ostade, Jan Steen, Gérard Terburg, Gabriel Metzu, Gérard Dow, is carried to the highest point the genre painting of contemporary life, the *extériorité*, which so strongly differentiates this Northern art from that of Italy. In the painting of landscapes, animals, marines, and even still-life, this excellence of technique was also maintained, reaching its supreme development in the genius of Rembrandt (1607-69), the greatest master of light and darkness of any school of painters. Under François I., a number of Italian painters were induced to visit France, many of them being employed in the decorating of the palace of Fontainebleau, and their influence prevailed strongly for nearly two centuries. The art of the 17th century was largely the official art of Louis XIV. and of his court painter, Charles Lebrun; one of the most important events was the establishment of the Academy of Painting and Sculpture at Paris in 1648. A much more graceful and idyllic art was introduced by Nicholas Poussin; and the classic landscape by Claude Gelée, called Claude Lorrain.. In England, also, foreign artists, in this case French, Flemish and even Greek, were largely employed before the reign of Henry VII. (1485-1509), in painting miniatures on glass, enamels, etc. The example of Henry VIII. in encouraging the great Holbein was followed by his successors,—Mary Tudor employed Antonio de More (Antonio Moro); Elizabeth, Lucas de Heere and Federico Zuccari; Charles I., Rubens and Van Dyck; Charles II., Peter Lely, of Soest in Westphalia, and Godfrey Kneller of Lübeck. The only English names that assume any importance in these annals are those of Isaac Oliver, his son Peter, Samuel Cooper, a pupil of Van Dyck, Robert Streator, Henry Anderton, and Peter Monamy.

Eighteenth Century.—During the 18th century the art of the Netherlands passed into an eclipse, recognized, and deplored, by the national historians. and that of Germany into another, which was long hailed as a 'revival.' Belgium, the battle-ground of Europe for so many years, exhausted and ravaged under its constantly changing rulers, could furnish no encouragement to the arts, and the painters, like those of Holland, with a very few exceptions, abandoned their own initiative and the study of native art for the servile imitation of the works of their predecessors,—the portraitists and the figure painters, such as Rubens and Lebrun; the landscapists, like Poussin; the battle painters, like Philips Wouwerman, etc. In Germany, the revolt against the general decline was called the Classic Movement, the first of the three great epochs into which this revival is divided, and which is dated from the arrival of Raphael Mengs in Rome, in 1741. The future leaders in the second phase of this movement, Cornelius, Overbeck, Veit,

Schadow, etc., were all born in the very last years of the century. Great Britain and France, on the contrary, developed, in a number of distinct schools each, fresh evidences of a national and original art, in practically all the branches of painting. In portraiture, the British record the names of Reynolds, Gainsborough, Romney and Raeburn; in genre, not always satiric, Hogarth—one of the most preëminently national of all artists, and Wilkie; in landscape, Gainsborough, Old Crome, Constable and Turner. In academical and historic art, the Americans, Copley and West, rose to international eminence. In France, the last days of the monarchy were made illustrious by the delicate and graceful courtly art of Watteau, Pater, Lancret and Fragonard, the frail idylism of Greuze, and the admirable naturalism of Chardin to be succeeded in their turn by the pedantic 'classicism' of David and the Empire. This century is distinguished also by the growing recognition of the popular interest in art, encouraged by the opening of royal galleries and the dissemination of engravings. Three female painters appear, whose graceful talents entitle them to recognition,—in Venice, Rosalba Carriera (1675-1757); in Germany, Angelica Kauffmann (1741-1807); and in France, Mme. Vigée-Lebrun (1755-1842). In Italy, the last glories of the Venetian school flamed up in the daring and truly decorative work of Giambattista Tiepolo (1696-1770).

Nineteenth Century.—During the 19th century the supremacy in painting and sculpture was transferred to France; Paris, with its annual, official, salons, became the recognized capital of the fine arts for Europe and America. French art in this century has been considered to have passed through three great periods, corresponding closely with changes in the national government,—Classicism, Romanticism, and the third period, dating from 1848, the schools of the Second Empire and the Third Republic. All these have naturally had many sub-divisions. The classicism of Louis David, with its sacrifice of everything in painting to the outline and to what was considered to be an imitation of the antique, was obliged to yield gradually to the Napoleonic art, representations of battles and of state ceremonies, and to genre painting,—the last not being officially recognized till 1816. Classical painting, which dominated in Europe for 50 years, was almost exclusively figure painting; its rigid formalism gave way to a greater sympathy with nature even in the works of David's immediate pupils and followers, Regnault Picot, Baron Gérard, Gros, and Ingres. A much more living and sympathetic classic taste than David's was that of Prud'hon. Romanticism found its first expression in painting in the works of Géricault, though Delacroix, more emotional and more of a colorist, is considered to have been the leader. The essential narrowness of this form of art was also grad-

ually tempered by naturalism, so that its range became wider,—as in the very different art of Decamps, first of the Orientalists, and of Ary Scheffer and Paul Delaroche. Landscape painting began to assume that great importance which it has ever since maintained in modern art, and the way was opened for the famous Fontainebleau school of Corot, Rousseau, Tryon, Diaz, Daubigny, and Jules Dupré, in which the painting of cattle is also raised to its highest eminence. The school of the peasant—as it might be called—which has played so large a part in contemporary painting, both of France and of all the nations whose students have imbibed French methods and conceptions, permits of such a wide range of treatment as that between the very frank realism of Courbet and the 'hieratic gloom' of Jean-François Millet. Somewhere between these extremes are the rural scenes of Lhermitte and those of Jules Bréton, in which realism is tempered with a certain style, with a strong desire to avoid the merely commonplace.

The latter half of the 19th century saw the rise of so many and so widely differing movements and tendencies in French painting that no general classification is possible. Under the Second Empire the official art, that of the Académie and the Institut, included such celebrated names as those of Gérôme, Jules Joseph Lefebvre, Bonnat, Cabanel, Baudry, Bouguereau, and Henner. In genre, characterized usually by excessive delicacy and accuracy of finish, the highest place was held by Meissonier; and but little inferior was the work of Louis Leloir and Vibert. Something of the haunting antique influence appears in the work of Gleyre, Couture, and Flandrin, protesting against the rising flood of 'realism'; something also in that of the so-called Neo-Grecs, of which the two most sincere and persistent were Hamon and Aubert. The most graceful of the Orientalists was Fromentin, and the painters of Eastern subjects, in very varying methods, include many of the most celebrated names of this epoch, Gérôme, Henri Regnault, Benjamin-Constant, Belly, Boulanger, and others. Of the mystical school, uninfluenced by any conventions or traditions, he most striking example is that of Gustave Moreau; and one of the most distinguished and honored of the older men was Hébert. Nearly all the French figure painters are portraitists. Military subjects have been rendered with a realistic accuracy and a dramatic force never before attained, by Yvon, Detaille, De Neuville, Aimé Morot, Roll, and others; mural painting received a new inspiration from Puvis de Chavannes; a warmer splendor of color than that of the Venetians was revived by Monticelli; and the still-life of the early Dutch painters equaled by that of Desgoffe and Vollon. One of the most important manifestations of this contemporary school was that of the Impressionists, with their new theories of presenting absolute realities, and of

which the most uncompromising advocates among the leaders were Manet, Monet, Sisley, Pissaro, Caillebotte, and others. While the influence of this innovation still lingers, the contemporary art of the Salons shows but very little trace of it. It is to be noticed that the great decline in all artistic value of these annual Salon exhibitions, and of the national art generally, within the last ten years, has been admitted by the French themselves.

In Great Britain, the influence of the Pre-Raphaelite movement of 1851 is considered to be still very strong, especially among the younger painters, but it is certain that that of the Newlyn school, much later, and even of the Glasgow school in landscape painting, has had very much more to do with the introduction of more purely artistic conceptions and a much sounder technique. A few of these younger colorists, as La Thangue and Clausen, have been officially recognized by the Royal Academy, and the works of a number of the others, as Edward Stott, Alfred East, Alfred Parsons, and J. M. Swan, the animal painter, appear at its annual exhibitions. At the head of the academical school stands the name of Sir Frederick Leighton, afterward Lord Leighton; his immediate successors in the office of president, Sir John Everett Millais, and Sir Edward J. Poynter, sustain intelligently the traditions of an art whose greatest defect is generally in the brush-work. All forms of painting are represented in this school, historical, decorative, portrait, genre, landscape and marine. The British water color school has long been considered to be one of the most important branches of the national art; it likewise includes all subjects in its province, and treats them with much the same seriousness of detail as the oil-painting. The most important of the official bodies after the Royal Academy are the Royal Scottish and the Royal Hibernian Academies, and there are many minor societies representing various tendencies of the art.

Unlike England or France, northern Germany has never possessed one recognized center of the arts—the conflicting claims of Berlin and Munich being mutually disallowed; but in Austria, the capital, Vienna, has long enjoyed this distinction—in the 18th century, and in the 19th more particularly since the aggrandizement of the city following the razing of the outer walls in 1858. This period gave rise to a species of eclecticism in all the arts, in which a great variety of styles and influences prevailed. In Prussia and Bavaria, the second period of the great revival, led by Cornelius and Overbeck, began about 1810; and the third—the natural reaction against the mysticisms and devoutness of these 'Nazarites,' and hence considered to be naturalistic—about 1830. Still another regeneration is placed immediately after the close of the war of 1870-1. The development of this latter, however, was slow; the real leader in the modern

movement is considered to be Franz Stuck, who first became widely known at the exhibition in Munich in 1889. This movement was particularly directed against the academic formulas of the historic painters of the school of Piloty, and the rural genre of Defregger and Vautier. Much of the influence of the older men, however, still survives, and among those who escaped this general denunciation was the veteran Menzel. The three great 'Secession' movements were those of Munich, Düsseldorf and Berlin, but the art of the latter capital is still largely official. The secession in Austria, and the division of the painters into 'the old and the new,' dates from only about 1897. In Hungary, the national art, rising from the exhaustion and devastation of the numerous wars and revolutions, is considered to have taken form after the revolution of 1848.

Contemporary continental painting may be said to have been so greatly influenced by the art of France as to have fallen into a routine in which mere technical skill very frequently takes the place of any strong national or individual assertion. This is particularly true of Italy, Spain and Portugal. In the former, the Neapolitan painters, the chief of whom are Palizzi, Morelli, and his pupil, Michetti, are the most interesting and the best known abroad; about 1887 a society of Roman painters was formed to combat the commercial art of the day, for which Fortuny was considered to be largely responsible. Among the few painters with international reputations, two of the most prominent are Segantini and Madame Romani-Carlesimo. In Spain, also, but few traces are left of the brilliant Roman-Spanish school of Fortuny, even in the genre. In much broader methods all the brilliancy of the contemporary cosmopolitan technique appears in the luminous canvases of Sorolla y Bastida, and what are considered to be the qualities of Goya in the somewhat brutal scenes of daily life by Zuloaga. Dignified historical art is worthily represented by Pradilla; and the small Venetian scenes painted by Rico are widely known. Portuguese art has suffered from many national ills; the list of contemporary painters was headed by the king, Carlos I., until his assassination, February, 1908.

Painting in the Netherlands has not followed common lines of development in Holland and Belgium—in the latter, it has been susceptible to every new wind of doctrine from abroad, while the Dutch artists have remained faithful to what may be defined as the national principles for the last 30 years. This close appreciation of nature, the sense of the essential and intimate quality of things, differs from the famous national art of the 17th century, both in conception and in technical processes, but it seems to be rather an evolution than a revolution. The leaders in the movement against the undiscriminating assimilation of all other European methods, which

prevailed in 1830, were Josef Israëls and Jacobus Maris; the renown of the latter is shared by his two brothers, Matthys and Willem. The landscapes of Jongkind, Willy Martens, Blommers, and Anton Mauve, the marines of Mesdag, the domestic genre of Albert Neuhuys, the church interiors of Bosboom, have given this art an international renown. Among the younger painters, a not very important independent movement was set on foot within the last few years—that of the 'New Impressionists,' seeking the expression of greater vehemence, of more passion, in their works. The leaders in this were Isaac Israëls, the son of Josef, and Georges Hendrik Breitner. In strong contrast with this national art is that of a few denationalized painters who have gone abroad—as Kaemmere, in Paris, and Alma-Tadema in London. The somewhat undiscriminating revolt against all the old traditions in Belgium was inaugurated by the founding of the *Société libre des Beaux-Arts* in 1868, followed by various associations, publications, manifestations and 'discoveries.' So widely divergent are the principles of the modern school, however, that they include the historical paintings of Baron Leys, the marines of Clays, the powerful and gloomy renderings of the life and labor of the poor by Constantin Meunier, and the Impressionism of Evenpoel, resembling that of the Spaniard Zuloaga. Of the mystical and imaginative painters, the most reticent and refined is Fernand Khnopff; one of the so-called realists, very hard in design and color and sacrificing all tones and values, is Léon Fréderic.

Scandinavian art, also, shows divergencies, following national characteristics—that of Norway being ruder, somewhat more direct; that of Sweden following more faithfully the varying currents of foreign art, as does the scanty art of Finland; that of Denmark, seemingly more intimate, with comparatively little variety. The emancipation from foreign domination, mostly German and latterly French, is recent and is not yet complete, dating in Denmark from the commencement of the 19th century, under Thorwaldsen the sculptor and Eckersberg the painter; and in Norway from only about 1890. The sound technical training that permits of the rendering of even the distinctively northern themes, the clear, cold, impressive aspects of nature, the sincere and intimate domestic genre, has in nearly all cases been acquired in foreign schools—Norway and Finland having none of their own; and of the most brilliantly equipped of these painters, as the Swede, Zorn and the Norwegian, Thaulow, it is to be said that their art, like their celebrity, is cosmopolitan. Many of the artists trained in Paris have identified themselves with the contemporary French school—the Norwegians generally excepted. Among the few painters who have remained distinctly national, one of the most original and most decorative in his work is Carl Larsson of Sweden; Gerhard Munthe of Norway, a

good landscape painter, owes his international reputation to his very curious and novel renderings of ancient legends.

The art of Switzerland, like the best of all that of the minor countries, even the South American and the Danubian, reflects strongly the influence of the Parisian schools. In Basel, however, in 1897, was celebrated a double festival in honor of Holbein and Böcklin, the latter a painter whose art was singularly free from all traditions whatever.

The art of Western Europe was first introduced into Russia by Peter the Great; before him it was barbaric, or semi-Byzantine, like the civilization. The Saint Petersburg Academy of the Arts was founded by the Empress Elizabeth in 1757. In its curriculum the imitations of the various European schools of painting were taken up in turn, or simultaneously, from Carracci and Guido Reni to the classicism of David and Mengs. The reaction against these has naturally developed a number of painters who strive to give expression to the sympathy with their own race or their own ideals; many of them share the depression, the pessimism, which characterizes so much of the contemporary literature. This affects strongly the landscape sentiment, even in the works of artists who have returned from studying abroad. Of these figure painters, the most important are Répin, Wasnetzoff, Serof, and some others, the first named being one of the boldest of the realists of any school or time. Verestchagin (d. 1904) was well known abroad by his very numerous and very large canvases in which he sought to depict the horrors of war. In the Russian school are included the two Finnish painters, Edelfelt, whose figures and portraits are rendered with all the excellence of Parisian technique, and Axel Gallen, whose strikingly original paintings depict weird scenes in the national legends. Of the painters of Poland, the most widely known are Matejko and Joseph Brandt.

In the United States, painting has developed along the lines of technical excellence, rather than in any striking or inspiring development of a great distinct national art. Even in the matter of technique, some of the early portrait painters, as Gilbert Stuart and the wood-engraver, A. B. Durand, remain unsurpassed. Trumbull and Washington Allston were not only portraitists but also painters of historical and imaginative compositions, the former excelling in the small heads in his large historical canvases, and the latter displaying more of a painter's feeling for tone and color. The art of Benjamin West and C. R. Leslie belongs rather to England, and is to-day quite alien. The modern landscape may be said to commence with the pictures of the visionary Thomas Cole, and it rapidly developed in the work of the painters of the 'Hudson River School,' the most important of which were J. F. Kensett, Sandford R. Gifford, W. Whittredge,

and Jervis McEntee. The great panoramic canvases of Albert Bierstadt and the far more distinguished landscape compositions of Fred. E. Church, have no reflection in the work of to day. This landscape art has culminated apparently in the renderings of tone and atmosphere, and the sentiment of nature in her quieter moods, in the works of such artists as George Inness, Homer Martin and A. H. Wyant, and, of the stronger moods, Winslow Homer, a painter of the clearest insight and most truthful rendering. William Page and Daniel Huntington, each in his turn president of the National Academy of Design, enjoyed very considerable reputations as portrait painters, the former devoting himself to an effort to discover the secret of the color of the Venetians.' At the present day, Blakelock, Ryder, Horatio Walker, Murphy, Dewey, and Dearth represent the imaginative school of landscape; with them may be placed the more literal canvases of Tryon, Swain Gifford, Chase, Picknell, Bolton Jones and Theodore Robinson (d. 1896)—to mention only a few of a very long list. The portrait painters are also numerous; John S. Sargent enjoys an international reputation as one of the greatest of any school; Whistler (d. 1904), who resided in England, Eastman Johnson, Brush, Chase, Alexander, Vinton, Collins (d. 1903), George Butler, Wyatt Eaton, Beckwith (d. 1908), Tarbell, Benson, Vonnoh, Metcalf, Wiles and Fowler at home, are among the most distinguished, as is Miss Cecilia Beaux. Most of these also paint genre, or semi-decorative figure pieces; some of them having commenced as illustrators, or still practising that art. Among the latter are Howard Pyle, A. B. Frost, W. T. Smedley and Hopkinson Smith. E. A. Abbey, originally an illustrator, has transferred his residence to England and paints both in historical and in large mural compositions.

John La Farge is in a way a link between the old and the new, having been a pupil of Couture, and the first, practically, to seek color for its own sake, in oil, in his very numerous water colors, and in his later monumental work both on walls and in stained glass. Another of the older men, Robert Weir, is noted for his important figure compositions, apparently influenced by the European schools; Alden Weir renders much simpler scenes in methods somewhat more affected by wholly modern processes; Thomas Moran, mountain landscapes and Venetian scenes inspired by the English painters of the early part of the century. A number of the figure and landscape painters have established themselves in Paris, Mac Ewen, Melchers, Julius Stewart, Edwin Lord Weekes (d. 1903), Johnston, and others; Hitchcock in Holland, Ulrich in Germany, etc. The list of marine painters is also long; among the most talented are Arthur Quartley (d. 1886), Henry Snell, T. W. Richards, C. T. Chapman, and some others, and, among the older men, James Hamilton (d. 1878).

In figure painting there has seemed to be a lack of popular appreciation for anything more ambitious than small examples of genre, usually familiar and domestic themes, rather than for the historic or the more purely imaginative or mystical—the most important exceptions of late years being the dignified, almost monumental, canvases of Abbot Thayer, and the Oriental interiors of Siddons Mowbray. The increasing use of large mural paintings in public and private buildings has, however, developed a school of truly decorative artists, of which the first in point of time was Wm. Morris Hunt; the living painters are Mowbray, Dewing, Simmons, Blashfield, Vedder, Turner, Frank Millet, Robert Reid, and a few others.

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POSTSCENIUM, n. *pōst-sē'nĭ-ŭm* [L. *post,* behind; *scēna,* a scene]: the part of a theater behind the scenes.

POSTSCRIPT, n. *pōst'skrĭpt* [L. *post,* after; *scriptus,* written]: a paragraph added to a letter below the signature, and usually marked P. S.

POST-TERTIARY SYSTEM, n. *pōst-tėr'shi-a-rĭ sĭs'tĕm* [see each word separately]: in *geol.,* the last main division of the geological record, and which includes all the formations accumulated from the close of the Tertiary periods down to the present day. No sharp line can be drawn at the top of the Tertiary groups of strata. On the contrary, it is often difficult, or indeed impossible, satisfactorily to decide whether a particular deposit should be classed among the younger Tertiary, or among the Post-Tertiary groups. In the latter, all the mollusks are believed to belong to still living species, and the mammals, although also mostly still of existing species, include some which have become extinct. These extinct forms are numerous in proportion to the antiquity of the deposits in which they have been preserved. Accordingly a classification of the Post-Tertiary strata has been adopted, in which the older portions, containing a good many extinct mammals, have been formed into what is termed the Pleistocene, Post-Pliocene, or Glacial group, while the younger deposits, containing few or no extinct mammals, are termed Recent.

The gradual refrigeration of climate was prolonged

and intensified in Post-Tertiary time. Ultimately the northern portion of the northern hemisphere was covered with snow and ice, which extended into the heart of Europe, and descended far southward in North America. The previous denizens of land and sea were in large measure driven out, or even in many cases wholly extirpated by the cold, while northern forms advanced southward to take their places. The reindeer, for instance, roamed in great numbers across southern France, and Arctic vegetation spread all over northern and central Europe, and what is now the Temperate zone of America. After the cold had reached its climax, the ice-fields began to retreat, and the northern flora and fauna to retire before the advance of the plants and animals which had been banished by the increasingly severe temperature.

The insensible gradation of what is termed the Pleistocene into the Recent series of deposits affords a good illustration of the true relations of the successive geological formations to each other. We can trace the gradual passage because it is so recent that there has not yet been time for those geological revolutions which in the past have so often removed or concealed the evidence that would otherwise have been available to show that one period or group of formations merged insensibly into that which followed it. The Recent formations are those which have been accumulated since the present general arrangement of land and sea, and the present floras and faunas of the globe were established. They are particularly distinguished by traces of the existence of man. Hence the geological age to which these belong has been spoken of as the Human Period. But there is good evidence that man had already appeared on earth during Pleistocene time, so that the discovery of human relics does not afford certain evidence that the deposit containing them belongs to the Recent series. Nevertheless it is in this series of the Post-Tertiary deposits that vestiges of man become abundant, and that proofs of his advancing civilization are contained.

During the Recent period the same agencies have been and are at work as those which have been in progress during the vast succession of previous periods. No trace can anywhere be detected of a break in the continuity of the evolution through which our globe has passed.

POSTULANT, n. *pŏs'tū-lănt* [F. *postulant*, a candidate, a suitor—from L. *pos'tulans* or *postulan'tem*, demanding; *postulātus*, demanded; *postulārĕ*, to demand]: one who or that which demands; a candidate. POS'TULATE, n. *-lāt*, or POS'TULA'TUM, n. *-lā'tŭm*, something to be assumed or taken for granted; in *logic* or *phil.*, a proposition whose truth is assumed as a foundation for further reasoning: in *geom.*, a self-evident problem: plu. POS'TULATES, *-lāts*, or POS'TULA'TA, *-lā'tă*. POS'TULATE, v. to assume; to take without positive consent; to solicit; to entreat. POS'TULATING, imp. POS'TULATED, pp. POS-

TULA'TION, n. *-lā'shŭn* [F.—L.]: the act of supposing without proof; supplication; suit; in *canon law*, presentation or recommendation addressed to the superior, to whom the right of appointment to any dignity belongs, in favor of one who has not a strict title to the appointment. It is one of the forms of proposing to the pope persons nominated, but not, strictly speaking, elected, to a bishopric. It is used also in the case of elections in which the candidate, though regularly chosen by the electors, yet is under some legal disability which involves the necessity of a dispensation. POS'TULA'TORY, a. *-tėr-ĭ*, assuming without proof.

POS'TULANT: the canonical term for one who desires to take holy orders in the Protestant Episcopal Church of America, and whose name has been entered by the bishop upon a list of postulants, as required by Canon 2, Title 1 of the Digest. A postulant may in due course be recommended, by the standing committee of the diocese, to the bishop for admission as a candidate for holy orders. The term is applied in the Roman Catholic Church to those on probation before entering a religious order.

POSTULATE, in Geometry: a statement so obvious that its truth may be taken for granted, or a construction so simple that it may be assumed that it can be performed. Euclid's postulates were six in number: (1) 'Two points can always be connected by a straight line; (2) a line can be produced'; (3) a circle of given radius can be described about a given center; (4) all right angles are equal; (5) if two lines meet a third line at angles whose sum is less than two right angles, the two lines will meet if sufficiently produced; (6) two lines cannot enclose a finite space. In reality the Euclidean geometry involves other postulates also, such as that a figure may be moved about without change of size or form. The postulates of geometry have been critically analyzed and reduced to a minimum by Hilbut: *Grundlagen* der Geometrie, 1899.

Postulates are distinguished from axioms, in that the latter are general principles holding in every field of thought. But the distinction is losing its importance with the development of the logical foundations of mathematics.

But in Philosophy, the postulate takes a much wider sweep, and expresses the most fundamental concessions implied in all reasoning, being prerequisite to the establishment of the axioms themselves. Thus, it is a postulate necessary to reasoning and discussion that a reasoner shall be consistent with himself—that he shall not affirm a thing one minute and deny it the next. The so-called Laws of Thought—Identity, Contradiction, and Excluded Middle—are so many forms of the postulate of consistency. These laws are tantamount to demanding that the same thing shall not be maintained in one form, and

denied in another: if we say that this room is hot, we must not, at the same time, say that it is not hot. So the ordinary law of the syllogism, 'Whatever is true of all the members of a class, is true of each,' is not so much an axiom as a postulate of consistency: we must be prepared to repeat individually the statements that we have affirmed collectively. The ultimate premises of all truth and reasoning may be put in the form of postulates, as follows: 1. Present Consciousness must be admitted as a ground of certainty. 'I am thirsty,' 'I hear a sound,' as facts of present consciousness, are to be held as trustworthy in the highest degree, or as amounting to the highest certainty. 2. But present consciousness is not enough; it must further be conceded that Past Consciousness is a ground of certainty. Present consciousness does not amount to an experience of value for future purposes, unless taken with past. Now, though a remembrance that is long past is often uncertain, a recent remembrance must be pronounced absolutely certain, not less than a present consciousness. That 'I was thirsty a short time ago,' I must be certain of, in order to establish the induction, 'that water quenches thirst.' 3. It must further be conceded, that 'What has been in the past, all circumstances holding the same, will be in the future.' That a thing has been, does not imply that it will be. We may admit that the sun has risen to-day, and rose yesterday, and so on, and without inconsistency, refuse to admit that it will rise to-morrow. People are generally disposed to treat this as a certainty; indeed, there is a strong natural tendency of the mind to expect that the future will resemble the past, which, when corrected and regulated by experience, constitutes our belief in causation and the uniformity of nature. Still, a blind instinct is no guarantee for truth; and as the assertion of the future is a distinct position, it should be formally assumed in a separate postulate. However often a thing may have happened, we still make a leap, and, so to speak, incur a risk in venturing to predict its future recurrence. Our confidence no doubt increases with repetition, but nothing can obliterate the line between what *has been* and what *is to be*.

These three Postulates of Experience, coupled with the Postulate of Consistency, seem adequate as a practical basis of all the recognized axioms and truths of experience. In other words, the concession of them is enough to commit any one to the reception of all ordinary inductive and deductive evidence.

POSTULA'TION: in canon law, an appeal to a competent authority to remove a disability by which one who has been appointed to a benefice is prevented from entering upon it. The canon law declared that a person once elected to one see could not be elected to another; and when an electoral college desired the bishop of another see to occupy their own, they petitioned the bishop to make the change.

POSTURE, n. *pŏs′tū* or *-chûr* [F. *posture*, posture—from L. *positūra*, position, situation—from *positus*, put or placed: It. *positura*]: place; situation; the disposition of a figure and its several parts with regard to the eye, as a human body or a statue; natural position of the body; attitude; position; frame; state; condition: V. to place and dispose in a particular way for a particular purpose. POS′TURING, imp. POS′TURED, pp. *-tūrd*. POSTURE-MASTER, one who teaches or practices artificial postures of the body.—SYN. of 'posture, n.': attitude; position; gesture; action; place; situation; station.

POSTURES, *pŏs′tūrz*, in Worship: attitudes observed in worship, private or public, but especially the latter. They are the natural expressions of the feeling which accompanies or characterizes the particular devotion in which they are employed, and are used by suppliants to man as well as to God. Four postures are found to have been used by the ancient Christians in their prayer—the standing, the kneeling, the bowing or inclined, and the prostrate. Of these, the ordinary one was kneeling; but for it was substituted, during the Easter-time and on the Sundays, a standing posture, understood to symbolize the resurrection of the Lord Jesus. To this usage we find allusions as early as the time of Justin the Martyr. In the paintings of the catacombs, and on the ancient enamelled glasses found therein, the standing P. in prayer is accompanied by outstretched and upraised hands. The bowing P. was rather a special act of reverence accompanying a particular address or a particular part of an address, than a sustained posture. It occurred at frequent intervals in the ancient liturgy, and is still used in the Roman mass as well as (even more profusely) in those of all the various rites, Greek, Syrian, Coptic, Armenian, and Russian. The prostrate P. was the attitude of the deepest humiliation, and was used mainly by the Penitents (q.v.), especially in that grade of public penance known as 'prostration.' It is also used still in the solemn ordination of subdeacons, deacons, and priests, in the Rom. Cath. Church. The question as to the use of particular postures was a subject of much controversy between the Puritans and the Church of England; and has recently been revived in the Presb. Church of Scotland.

POSY, n. *pō′zĭ* [a corrupt form of *poesy*, in the sense of 'sentiment']: a motto or device; a bunch of flowers; a bouquet; a bunch of flowers, in the sense of the language or sentiment of flowers.

POT, n. *pŏt* [F. *pot*—from mid. L. *potus*, a pot: Icel. *pottr;* Ger. *topf;* Fin. *pata*, a pot: Gael. *poit*, a pot: Ir. *pota;* akin to L. *pōto*, I drink]: a circular vessel deeper than broad, in use for various domestic and other purposes, generally for cooking meat on a fire; a mug for liquor; a quart, as of beer; a deep earthenware vessel of various shapes and sizes: V. to put into pots; to preserve in pots; to put into casks for draining, as sugar. POT′-

TING, imp.: N. the act or process of putting into pots, said specially of plants; the operation of pouring hot liquid-sugar into earthen molds for refining it; the act of pouring new-made sugar into casks to cure it and drain off the molasses. POT′TED, pp.: ADJ. placed or preserved in a pot. POT′TER, n. *-tėr*, a maker of earthen vessels. POT′TERY, n. *-tėr-ĭ*, all kinds of clay or earthenware; place where earthenware goods are manufactured; art of manufacturing earthenware (see below). POT-BELLIED, a. *-bĕl′lĭd*, having a bulging, or protuberant belly, in allusion to the prominent convexity of the circumference of iron pots. POT-BOILER, any work of an artist intended to meet the popular demand and to bring pecuniary return, rather than to conform strictly to the highest canons of his art: such work may not be without merits, but usually reveals haste and a low standard. POT-BOY, or POTMAN, the boy or man who carries out beer for sale, or who attends to customers in a public-house. POT-COMPANION, an associate in hard-drinking. POT-HERB, any vegetable suitable for flavoring soups—not (as might be supposed) one of the important culinary vegetables. POT-HOLES, round caldron-shaped cavities or holes occurring in the channels of streams, and along the seashores, formed by the grinding action of loose stones. POT-HOOK, a hook for suspending an iron pot over a fire: an elementary turn for learners in writing. POT-HOUSE, a low drinking-house. POT-LUCK, a familiar term for taking chance of what may be for dinner, without a formal invitation. POT-METAL, a kind of stained glass; melted glass as it comes from the glass-pot: gray, brittle, granular alloy of lead and copper for making pots. POT-PAPER, a quality of paper, named from a *pot*, the old water-mark. POT-VALIANT, valiant over the liquor only. POTTED MEATS, meats preserved by being parboiled, or by other processes, and then placed in vessels from which means is taken carefully to exclude the air. POTTER'S CLAY, a clay suitable for being manufactured into pots or earthenware. POTTER'S WHEEL, a wheel or revolving tool used by the potter in the manufacture of earthenware goods. POTTING-HOUSE, a house where plants are potted. TO GO TO POT [an expression to be explained from prov. Sw. *putt*, pit, hell], to go to ruin; to be destroyed or wasted. POT CALLS THE KETTLE BLACK, a person who accuses another of faults or crimes of which he himself is guilty.

POTABLE, a. *pō′tă-bl* [F. *potable*—from L. *potab′ĭlĭs*, drinkable—from *pōto*, I drink: It. *potabile*]: fit to be drunk; drinkable. PO′TABLENESS, n. *-bl-nĕs*, the quality of being drinkable. POTATION, n. *pō-tā′shŭn*, a drinking-bout; a draught. POTATORY, a. *pō′tă-tėr-ĭ*, of or relating to drinking.

POTAGE: a spelling of POTTAGE, which see.

POTAL, n. *pŏt′ăl*, or POTALE, n. *pŏt′āl* [from *pot*]: the refuse, grains, etc., from a distillery used for feeding cattle and swine

POTANCE, n. *pō′tăns* [F. *potence*, a gibbet—from mid. L. *potentĭa*, a support]: the stud in a watch in which the lower pivot of the verge plays.

POTASH, n. *pŏt′ăsh*, POTASH′ES, n. plu. *-ăsh′ĕz* [Dut. *potasch;* F. *potasse;* Ger. *pottasche*, potashes: Eng. *pot*, and *ashes*]: an alkali obtained from the ashes of certain plants, so called because the ashes being washed in a large pot or vessel, the water is then evaporated to obtain the alkali; *strictly*, the hydrate of potassium, as a commercial product met with in the form of gray ashes in a caustic state; *pearl-ash* is the gray ashes freed from some of their impurities, and presented in the condition of carbonate. *Potash* and *Pearl-ash* of commerce are largely derived from the vast quantities of wood cut down and burned in clearing for culture the forest lands of Canada and the n. United States; also from the branches of the trees felled for timber. The ashes, mixed with a small quantity of quick-lime, are put into large wooden cisterns, and covered with water. The whole is well stirred up, and allowed to settle; the next day, the clear liquor is drawn off, and evaporated to dryness in iron pots (whence its name). When a sufficient quantity is got to fill a cask of 5 cwt., it is fused at a red heat, and poured into the cask. The mass when cold is colored gray externally, but when broken, shows a pinkish tint internally. It is very deliquescent, consequently the casks require to be nearly air-tight. In this state, potash contains about 40 per cent. of foreign materials, among which sulphur and carbonaceous matter predominate. This is the crude American potash of commerce. If it is calcined by a reverberatory furnace, the sulphur is driven off, and the carbonaceous matter burned out; the carbonic acid, however, combines with the potash, and forms it into a carbonate. To form it into *pearl-ash*, it is then broken up, and dissolved in water in a wooden cistern, having a perforated bottom covered with straw, through which it filters, and is afterward evaporated in flat-bottomed iron pans. As it approaches dryness, it is stirred with iron rods, which break it up into round lumpy masses of pearly-white color, and in this state it is the pearl-ash of commerce, and contains about 50 per cent. of pure potassa. All land-plants yield potash when burned, and many in much greater proportinos than the timber-trees of N. America; but the circumstances in which the materials are there obtained, especially in Canada, give that region the advantage in competition with the world. See POTASSIUM.

POTASH-WATER: see AERATED WATER.

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